SERVICE INFORMATION
PHYACTION U/E/I/C

Version 0.1 May 2004

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2. Preface

The Phyaction series are a family of modern electrotherapy units.
As a member of the Uniphy family they are built according to the most recent requirements of the MDD security standards.
All functions of the unit are controlled by a microprocessor, ensuring a high degree of reliability and safety.

An integrated service software system gives the service technician a maximum of information, in order to locate and repair a technical problem in the most efficient way.

This service manual gives a complete and accurate technical picture of the Phyaction series.
In doing so, it will hopefully help you to reach your goal: to form a correct diagnosis and to solve the client's problem as thoroughly as possible.

If you have any questions or if you need additional information about this manual or about the use of the unit, please do not hesitate to contact us.

GymnaUniphy nv, May 2004

3. Important remarks

3.1 Safety aspects

To understand and practice all procedures described in this manual a good technical background is a must.
GymnaUniphy cannot be held responsible for any actions executed on the unit by unauthorised persons, or for executing any procedures not prescribed in this manual.

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3.2 Data registration

The Phyaction series has a defined number of critical parts . All critical parts have a serial- or batch number (marked with a label). GymnaUniphy has the original configuration of each unit and its critical parts.
In case of a configuration change to one or more of the critical parts, the distributor has to file the serial- or batchnumber of the part in question.

The **Phyaction U** has following critical parts:

- Ref 322517: Main PCB Phyaction U
- Ref 117162: Ultrasound PCB C/P 200 & Phyaction C/U
- Ref 116954: Power supply 200 series & Phyaction I/E/C/U
- Ref 130015: AC inlet GymnaUniphy

The **Phyaction C** has following critical parts:

- Ref 322528: Main PCB Phyaction C/E
- Ref 117162: Ultrasound PCB C/P 200 & Phyaction C/U
- Ref 116954: Power supply 200 series & Phyaction I/E/C/U
- Ref 130015: AC inlet GymnaUniphy

The **Phyaction E** has following critical parts:

- Ref 322528: Main PCB Phyaction C/E
- Ref 116954: Power supply 200 series & Phyaction I/E/C/U
- Ref 130015: AC inlet GymnaUniphy

The **Phyaction I** has following critical parts:

- Ref 324914: Main PCB Phyaction I
- Ref 116954: Power supply 200 series & Phyaction I/E/C/U
- Ref 130015: AC inlet GymnaUniphy

To file this data, a data registration document is available on next page.

Data registration document

Information

Distributor name	Distributor address

Customer name	Customer address

Instrument name:	Serial number:
Date of delivery:	

Service activities

Date:		
Error complaint:		
Service action		
Critical spare parts exchange list		
Critical part name	**Old serial number**	**New serial number**

Date:		
Error complaint:		
Service action		
Critical spare parts exchange list		
Critical part name	**Old serial number**	**New serial number**

4. Technical data

This is a summary of the technical data as described in the user manual.

4.1 General technical data

- Mains voltage: 100 → 240 VAC 50/60 Hz
- Mains fuses : 2 x T2A/250 V
- Power consumption: maximum 85 VA
- Dimensions (w x h x d): 265 x 275 x 122 mm
- Languages: English, Dutch, French, German, Italian, Portuguese, Spanish
- Weight: +/- 4,6 kg
- Electrical Class I
- Isolation: Type BF

4.2 Electrotherapy (for Phyaction E/I/C)

- Number of electrotherapy channels: 2
- Treatment time: 0-60 min
- Current safety limit: 150% of set current or 110% of the maximum for the selected current shape.
- Accuracy 10% with a 500 Ω load
- Mode CC/CV except for MF constant rectangular current

4.3 Ultrasound therapy (for Phyaction C/U)

- Treatment time: 0-30 min
- Output power continuous: 0-2 W/cm²
- Output power pulsed : 0-3 W/cm²
- Duty Cycle: 10%, 20%, 30%, 40%, 50%, 100%
- Pulsfrequency: 100 Hz
- Accuracy: +/- 20% at maximum intensity
- **Ultrasound head** model U91
  Power: max 3,8 W at 1,1 MHz
  Power: max 2,8 W at 3,2 MHz
  ERA: 1,9 cm² at 1,1 MHz
  ERA: 1,4 cm² at 3,2 MHz
  Frequency: 1,1 and 3,2 MHz
  BNR: 5,2 at 1,1 MHz
  BNR: 3,3 at 3,2 MHz
- **Ultrasound head** model U92
  Power: max 8,1 W at 1,1 MHz
  Power: max 9,5 W at 3,2 MHz
  ERA: 4,0 cm² at 1,1 MHz
  ERA: 4,8 cm² at 3,2 MHz
  Frequency: 1,1 and 3,2 MHz
  BNR: 4,5 at 1,1 MHz
  BNR: 5,8 at 3,2 MHz

5. Unit self test.

The self test checks proper functioning of the product, especially the safety circuits, and is activated every time the unit is switched on. The tests are performed by the main micro-controller in combination with the safety micro-controller and take approximately 12 seconds.

When one or both of the controllers detect an error, the output will be disabled. A message will be shown to the user.

The Phyaction series have a safety relay (RLY209). This relay (Normally Open) is integrated in the applied part of channel A and Channel B (same relay). In case of a problem, the safety relay will be switched off immediately and the patient becomes disconnected from the unit.

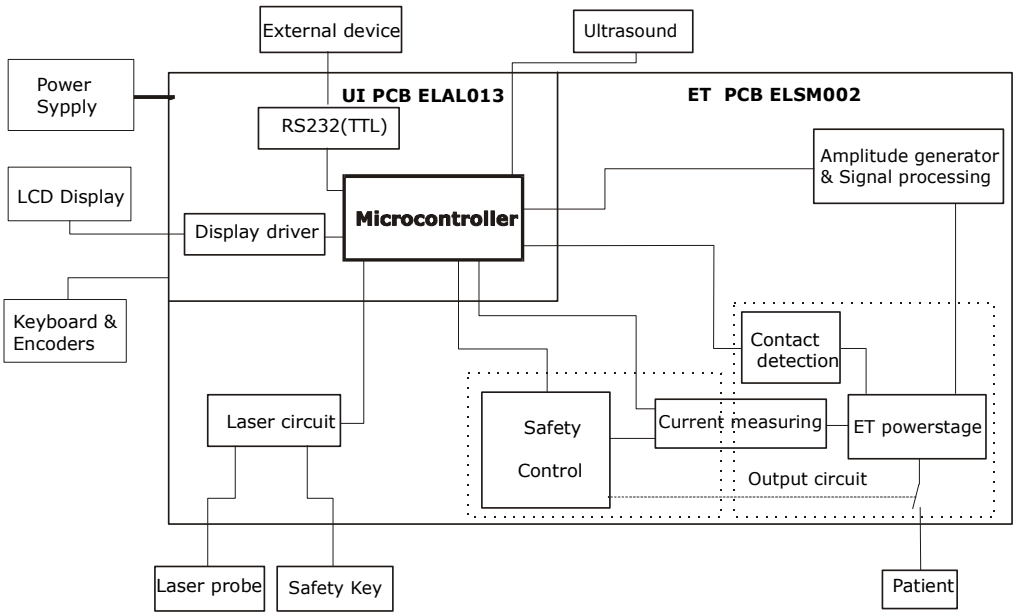
The safety relay driver circuitry is accessible to the main microprocessor for 3 seconds after power up of the unit. After this period the main micro-controller will not be able to switch the electrotherapy safety relay on any more. Both the main and the safety micro-controller are able to switch the electrotherapy safety relay off (the safe state).

During the selftest of the unit, the following items are checked:

1. Main controller test.
2. Safety controller test.
3. Safety software test.
4. Electrotherapy DAC test Channel A
5. Electrotherapy DAC test Channel B
6. Electrotherapy relay test.
7. Electrotherapy safety comparator test.
8. AC/DC relay test.
9. CC/CV mode test.

6. Circuit description.

6.1 Block shematics



6.2 Power supply

A Switch Mode Power Supply supplies the PCB with +15V, +5V and −15V.
U114 regulates the −15V down to a −5V supply.
Circuit around U119 is a square wave oscillator that generates a square wave with a maximum voltage of 0V and a minimum of –15V. Following is a voltage doubler that converts the –15V to –30V that is then regulated up to –22V by the zener D113 for the LCD contrast.

6.3 User interface board (UI)

The user interface boar is a separate board for the Phyaction U. For the Phyaction E/I/C it is mechanically linked to the electrotherapy board.

6.3.1 Microprocessor circuits.

U103 is the micro controller. U109, U110, U115 and U116 are static RAM's. U109 and U110 are 32k Ram's and U115 and U116 are 128k Ram's. Only one sort is placed, the 32k's or the 128k's depending on how much memory is needed. IC's U101 and U102 are Flash Memories that contain the software.
All these devices are addressed by the address bus CA[0:23] and the data is transported over the data bus DQ[0:15].

6.3.2 Display and keyboard circuits.

U123 is the LCD display driver with its own RAM's namely U111 and U112. They are addressed via VA[0:15] and the data is transported over data bus VD[0:15].

Besides controlling the safety circuits (described further on) the "safety" µprocessor U122 does the scanning of the keyboard and of the two encoders.

The four ENC pins on port B scan the two encoders. The four KEY_SCAN pins of port B are used to select the scan lines of the keyboard. KEY_CLK provides the clock on which the keyboard will be scanned and KEYB_INPUT receives the serial information from the key scan.

6.4 Electro stimulation PCB

This board is mechanically connected to the user interface board and is installed only in Phyaction C/E/I.

6.4.1 Amplitude generation and signal processing

The amplitude and signal generation is fully done with D/A converters. U214 is a quadruple 8-bit D/A converter with each DAC having its own reference input.
Each electrotherapy channel uses two of these DACs in series. The first DAC the Amplitude DAC has a reference of 2,5 V. This DAC is used too set the Amplitude of the signal. Its output is used as reference for the second DAC the LFDAC. This DAC modulates its input and therefore can generate the waveforms such as triangular or sinusoidal ➔ DAC_A/B.
The circuit around Op-Amp U231 inverts the signals DAC_A/B ➔ IPAA/B
Via the analogue multiplexer U204 a couple of signals from the ET stage can be fed back to the ADC input of the micro controller U103 so these can be monitored.

6.4.2 Output circuits

Output circuit A and B are identical, therefore only output circuit A is explained.
The ET power stage has only one configuration in contrary to the 500/800 hardware namely constant current.

At the middle connection of the transformer is the +15V supply voltage connected. The two other sides of the primary windings are connected to the drains Q206.The gates of Q206 are connected to NEG_A and POS_A. These are the "chopper" FETs. The sources of Q206 are coupled together and are connected to the drain of Q208 that is the current regulator MOSFET.
The circuit round Op-Amp U221 and MOSFET Q208 controls the current. The circuit forces a voltage across current sense resistor R201 by controlling the gate-source voltage of Q208. IPAA is a measure for this voltage across or the current through R201 and so the output current.

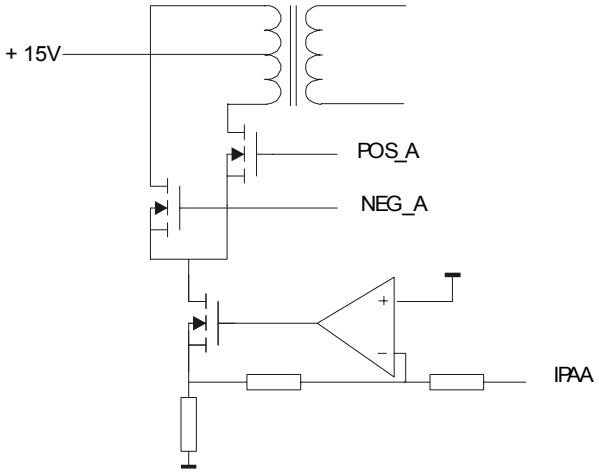


Figure 6-1 Simplified schematic ET powerstage

By making POS_A or NEG_A high one side or the other of the transformer will conduct a current and so on the secondary side of the transformer "positive" or "negative" pulses are generated.

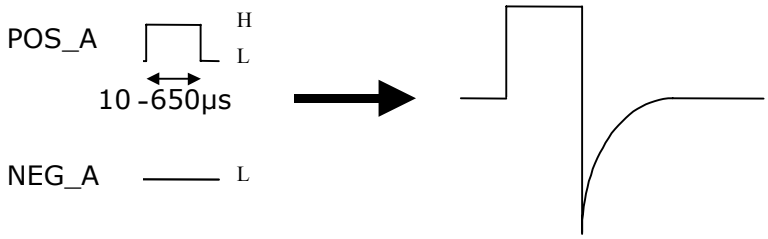


Figure 6-2 Tens biphasic a-symmetric generation

This can also be done in a constant stream of pulses (f=10kHz), which then generates a biphasic rectangular pulse train at the output.

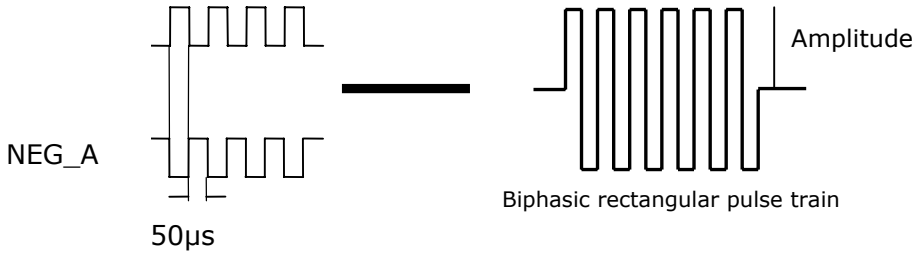


Figure 6-3 Biphasic pulse train

By varying or modulating IPAA the amplitude and waveform of the output signal is set.

Constant voltage mode:
The hardware has no real constant voltage mode. Instead a 1kΩ resistor is switched parallel to the current source. By applying the theorem of Thévenin you get a non-ideal voltage source with an impedance of 1kΩ.
This results in a behaviour that is close enough to a real constant voltage ➔ no large increase of output voltage when there is no load at the output.

At the secondary side there are some relays with which the rectifying or combination path can be selected or polarity can be changed.

6.4.3 Poor contact detection

Poor contact detection is done with an opto-coupler U216 in the secondary/patient circuit. When a current flows through a load/patient the output of U216 will go "low". When no current flows through a load (no load ➔ poor contact) the output will go "high".
Comparator U231 sees to it that no poor contact can be detected when the amplitude is very low (<10mA). Because opto coupler doesn't function properly at low amplitudes.
Only when there is a POS or a NEG signal there can be output. So only then poor contact detection should work.
Poor contact if: output opto coupler is high **AND** when POS or NEG is high **AND** Amplitude>10mA

6.4.4 Current measuring circuits

The output current is measured at the primary side with a high side current sense amplifier U212. It measures the voltage over a sense resistor of 80mΩ R320 and outputs a current equivalent to the current through this sense resistor. The output current is turned into a voltage by the output resistor so the voltage over R216 is a measure for the output current.
All component values are chosen so that at maximum allowable output current +10% (=120mA+10%=132mA) the output voltage of the current measuring is 2.5V
At poor contact the output of the current sense amplifier is shorted to ground with a MOSFET.
The circuit around Op-Amp U202 and analogue switch U205 is a hold-circuit. So that at non-continuous currents and/or AC currents the peak levels are holded.

6.4.5 Safety control circuits

The safety control module is built round μProcessor U122. The safety relay is driven by a RS flip-flop which is build with one NOR and two NAND's (U219 and U208).

In case of an error detection by one of the micro controllers, the Microchip (U122) can switch off the safety relay by making MC_SRY_OFF, "high". The Siemens μController (U103) can switch off the safety relay by making S_SRY_OFF, "high".

A "high" level on MC_SRY_OFF or S_SRY_OFF-line will bring the "SET" input of the flip-flop 'low'. The output state of the flip-flop becomes "low". The safety relay is switched off.

The "SET" input can also be "low" when the UVLO (under voltage lockout) or POR (power on reset) signals are "low".

Note that even when error is not longer occurring, the output state of the RS-flip-flop stays "low". The safety relay stays switched off.

In normal operation TIMELOCK is "high". When the safety relay is switched off, then the safety relay cannot be switched on again. The only way to reactivate the safety relay is to switch off and on the power.

When the TIMELOCK signal is "low", a reset of the RS flip-flop is done. The output-state of the flip-flop becomes "high". Safety relay is switched on. The output state remains as long as no "low" signal is available on the "SET"-input of the flip-flop.

Only during initialisation (self-test) TIMELOCK is low, so then the state of the safety relay is equal to (MC_SRY_OFF **NOR** S_SRY_OFF) **NAND** !PROTECTION.

Comparator U218 and DAC U206 guard the output level. U218 compares the output signals from the current measuring circuit CUR_A_SAF/CUR_B_SAF with FDBACK_SAFA/FDBACK_SAFB reference voltages. These reference voltages are generated by the safety DAC U206 and are set up by the μProcessor U122 via bus MC_DATA[0:7]. The levels of these voltages (0,284V-2,5V // 15mA-132mA) are a measure for the output current and are adjusted when the intensity of the ET output is altered by the user. U209 serves as a buffer for the FDBACK_SAFA/FDBACK_SAFB signals. If these signals are exceeded by CUR_A_SAF and/or CUR_B_SAF then !PROTECTION will go "low". This will change the state of the flip-flop from "high" to "low" so the safety relay RLY209 will be switched off.

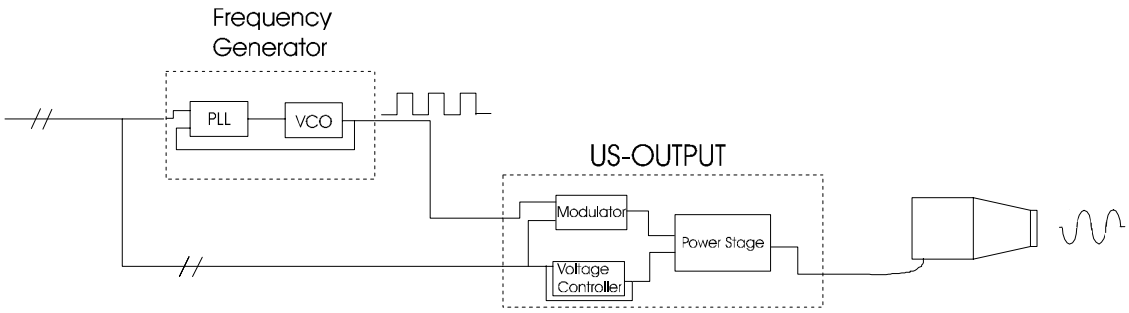
The ET_ERROR-line is "low" when the safety relay is on. The ET_ERROR-line is monitored by U103 and U122.

All these situations described above are only valid if CON202 is in OPERATE mode and CON9 has no jumper.
When CON202 is in service mode then the relay stays switched on even when error occurs. The error information is now directly linked with the ET_ERROR line.
If CON108s a jumper then the safety relay can be switched on/off at all time because TIMELOCK will be "low" at all time.

6.4.6 Relay circuits

IC U224 is a Darlington transistor array which makes it possible to drive the relays with the low power signals from the μC. Diodes for inductive load suppression are integrated in this IC.

7. Ultrasound heads



The Phyaction U and Phyaction C can be delivered with 2 different multifrequent ultrasound heads:

Model U91 : 1 cm² 1/3 MHz
Model U92 : 4 cm² 1/3 MHz

(See technical specifications for more details)

The unit has two ultrasound output connectors.

The ultrasound head converts the electric signal into ultrasound using a piezo crystal. This crystal, with a diameter depending on the desired head size, is glued in an aluminium cup that minimises electromagnetic radiation and enables the crystal to be used on to operating frequencies.
The aluminium cup can also be used as a second electrode if combination therapy is desired. A separate electrotherapy device needs to be connected to the safety socket for combination therapy.
An OTP is installed in the connector of the treatment head to enable the micro controller to detect whether a head is connected and to recognise the type of head that is connected. It also contains the calibration values of the head in question.

The ultrasound head has an auditif and visual contact control indication: the treatment heads are fitted with light of two colours, yellow and green.
The following configurations are possible:

Blinking green:	The US head is properly connected
Continuous green:	The US head is selected
Continuous yellow:	The US-emission is in progress
Alternating yellow/green:	Bad contact of the US head with the skin
Blinking yellow:	End of treatment

7.1 Contact control indication

Depending on the contact between the US head and the patient, the display has the following possible indications:

- : Bad contact, US head switched off (0 W).
- : Bad contact.
- : Sufficient contact.
- : Good contact.
- : Very good contact

8. Yearly safety inspection

The ‘Directive on Medical Devices’ from the European Commission (92/42/EEG) requires that safe devices are used.
It is recommended to perform a yearly technical safety inspection.
If the legislation in your country or your insurer prescribes a shorter period, you must adhere to this shorter period.

On the following pages the format of the yearly checkup is printed. Fill out this document for each test.

In order to perform this test, the following devices are needed:

- Digital Ultrasound power meter
- Oscilloscope 20 MHz at least
- 500 Ohm power resistor
- Electrical safety tester (according to IEC or VDE)

Safety inspection list

Customer identity

Unit:
Serial number:
Date:

Test 1: General inspection

	Pass	Fail	N.A.
Results of earlier safety inspections are available			
The logbook is present			
The type plate and supplier's label are legible			
The housing, the adjusting knobs, the keys and the display are undamaged			
Power connection and power cord are undamaged			
The output connectors are undamaged			
The electrode connectors and cables are undamaged (Phyaction E/I/C)			
Cable and connector of the ultrasound treatment head(s) are undamaged (Phyaction C/U)			
The US head(s) do not display any cracks or other damage that can endanger the insulation (Phyaction C/U)			
The automatic self-test when switching on the appliance does not report any errors			
The display does not have any defective points or lines			

Remarks:

Test 2: Electrotherapy

Skip this test for a Phyaction U

Connect a load of 500 Ω to the electrode cables of both connectors. Hook up an oscilloscope to the loads (black cable = ground).

Select channel A, program 4: MF Constant	Pass	Fail
At maximum intensity the output matches the set peak value within ±10%		
The output waveform corresponds to photo 1		
The polarity changes over to negative when set to **RED-**		
Disconnecting the load gives “poor contact to patient”		

Select channel B, program 4: MF Constant	Pass	Fail
At maximum intensity the output matches the set peak value within ±10%		
The output waveform corresponds to photo 1		
The polarity changes over to negative when set to **RED-**		
Disconnecting the load gives “poor contact to patient”		

Select channel A, program 23, 2 pole MF mode CV	Pass	Fail
At maximum intensity the output matches the set peak value within ±10%		
The output waveform corresponds to photo 2 and 3		
The yellow light next to the output connector is lit when intensity is not 0		
Disconnecting the load gives “poor contact to patient”		

Select channel B, program 23, 2 pole MF mode CV	Pass	Fail
At maximum intensity the output matches the set peak value within ±10%		
The output waveform corresponds to photo 2 and 3		
The yellow light next to the output connector is lit when intensity is not 0		
Disconnecting the load gives “poor contact to patient”		

Remarks:

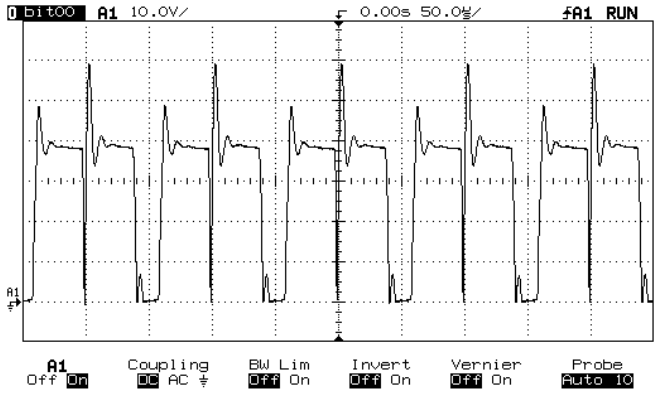


Photo 1

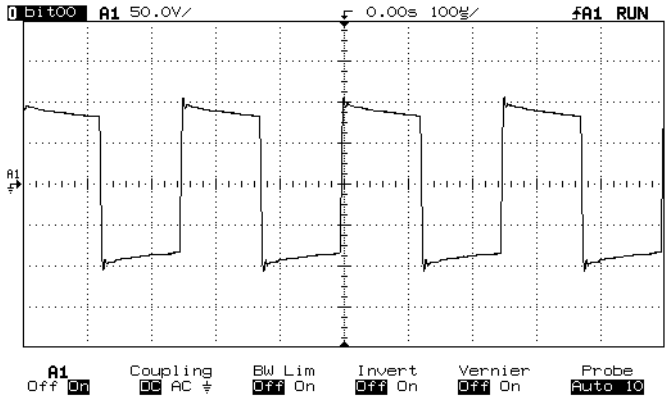


Photo 2

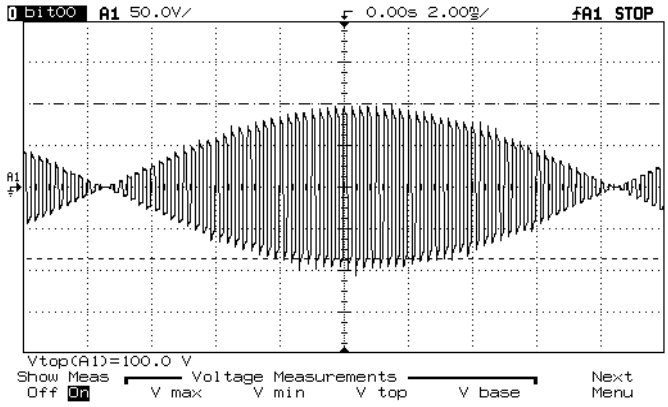


Photo 3

Test 3: Ultrasound

Skip this test for a Phyaction E or a Phyaction I

Connect the treatment head and place it in a calibrated ultrasound power meter.

Select ultrasound therapy

Ultrasound treatment head model U91 with SN

	Pass	Fail	N.A.
Select 1 MHz, continuous (duty cycle 100%), 2 W/cm² Measured value is ±20% of the P_{PK} value in the channel window			
Select 1 MHz, duty cycle 50%, 3 W/cm² Measured value is ±20% of half the P_{PK} value in the channel window			
Select 3 MHz, continuous (duty cycle 100%), 2 W/cm² Measured value is ±20% of the P_{PK} value in the channel window			
Select 3 MHz, duty cycle 50%, 3 W/cm² Measured value is ±20% of half the P_{PK} value in the channel window			
Select 3 MHz, duty cycle 50%, 0.5 W/cm² With a dry treatment surface the P_{PK} value drops to 0			
Select 1 MHz, duty cycle 50%, 0.5 W/cm² With a dry treatment surface the P_{PK} value drops to 0			

Ultrasound treatment head model U92 with SN

	Pass	Fail	N.A.
Select 1 MHz, continuous (duty cycle 100%), 2 W/cm² Measured value is ±20% of the P_{PK} value in the channel window			
Select 1 MHz, duty cycle 50%, 3 W/cm² Measured value is ±20% of half the P_{PK} value in the channel window			
Select 3 MHz, continuous (duty cycle 100%), 2 W/cm² Measured value is ±20% of the P_{PK} value in the channel window			
Select 3 MHz, duty cycle 50%, 3 W/cm² Measured value is ±20% of half the P_{PK} value in the channel window			
Select 3 MHz, duty cycle 50%, 0.5 W/cm² With a dry treatment surface the P_{PK} value drops to 0			
Select 1 MHz, duty cycle 50%, 0.5 W/cm² With a dry treatment surface the P_{PK} value drops to 0			

Remarks:

Test 4: electrical safety test according to VDE 0751

Parameter	Measured	Limit	Comments	Pass	Fail
Protective earth resistance	Ω	< 0.2 Ω			
Enclosure leakage current	µA	< 1000 µA			
Patient leakage current	µA	< 5000 µA			

The unit ……. With serial number …… has passed/failed the test

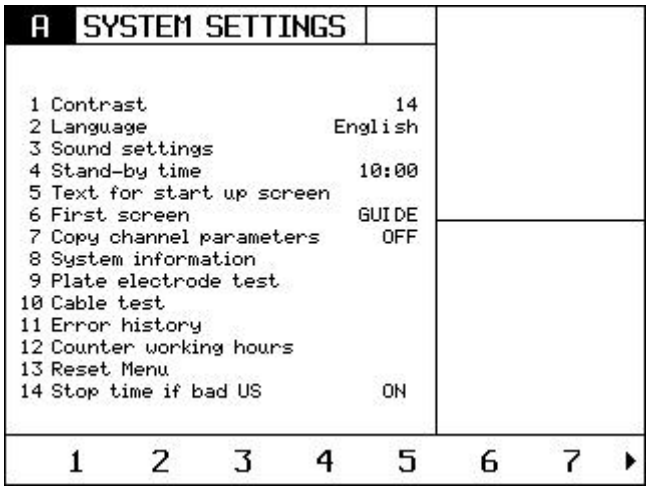
Name service engineer Signature

9. System settings menu.

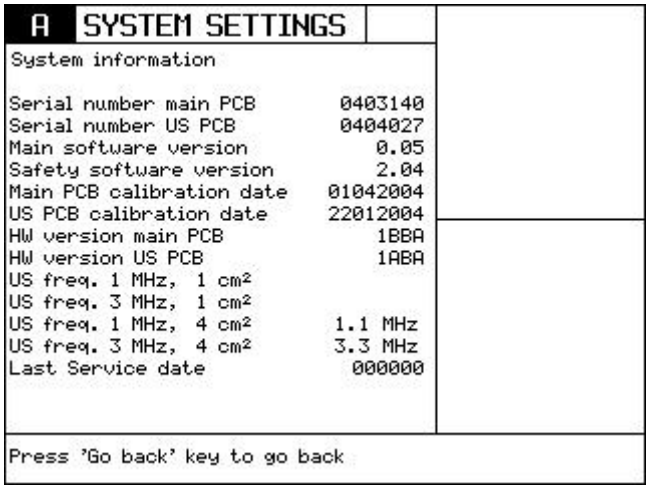
The system settings menu allows the user to personalize a number of parameters, to perform some tests and to check some machine info.
➧ Only the most important menu options are explained in this service manual.

In order to select the system settings menu, press the key.

The following screen appears:


A SYSTEM SETTINGS
1 Contrast 14
2 Language English
3 Sound settings
4 Stand-by time 10:00
5 Text for start up screen
6 First screen GUIDE
7 Copy channel parameters OFF
8 System information
9 Plate electrode test
10 Cable test
11 Error history
12 Counter working hours
13 Reset Menu
14 Stop time if bad US ON
1 2 3 4 5 6 7

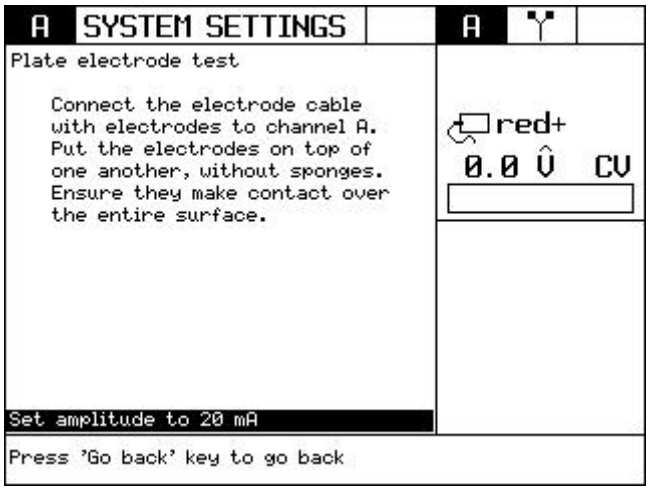
9.1 System information (8)


A SYSTEM SETTINGS
System information
Serial number main PCB 0403140
Serial number US PCB 0404027
Main software version 0.05
Safety software version 2.04
Main PCB calibration date 01042004
US PCB calibration date 22012004
HW version main PCB 1BBA
HW version US PCB 1ABA
US freq. 1 MHz, 1 cm²
US freq. 3 MHz, 1 cm²
US freq. 1 MHz, 4 cm² 1.1 MHz
US freq. 3 MHz, 4 cm² 3.3 MHz
Last Service date 000000
Press 'Go back' key to go back

This is an important screen for the service department.
It gives an overview of the hard- and software version(s) of the most important boards inside the unit.
In case of configuration changes, read chapter .

The last service date tells the customer when the machine was last serviced.

9.2 Plate electrode test (9).

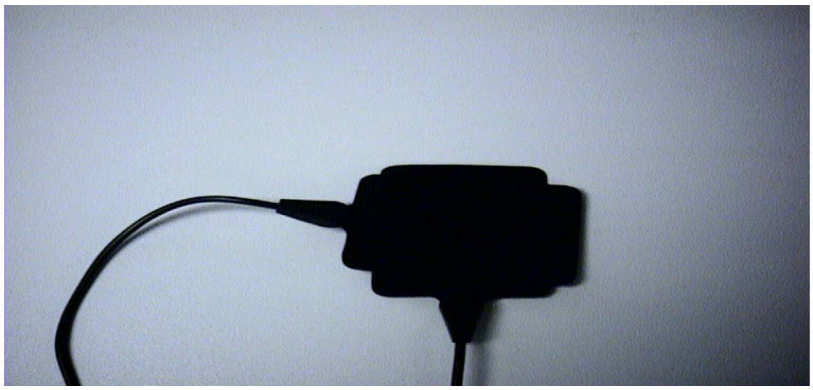

A SYSTEM SETTINGS
A
Plate electrode test
Connect the electrode cable with electrodes to channel A. Put the electrodes on top of one another, without sponges. Ensure they make contact over the entire surface.
red+
0.0 V CV
Set amplitude to 20 mA
Press 'Go back' key to go back

This menu option allows the customer to check the electrode for a faulty contact

Important: a cable test can only be performed through channel A.

Before checking the electrodes, it is important that the patient cable has been checked and has proved to be ok. (see point 9.3)
Please follow the procedure below to check both the rubber electrodes.

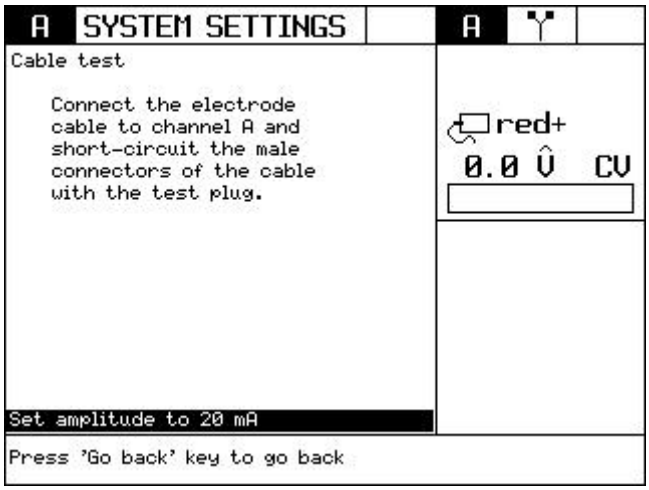
Select 'plate electrode test' in the system settings menu.
Connect a patient cable to the channel A and put the electrode on top of each other like the photo below.



Turn up the intensity to 10 V and move with the plugs and cable to detect a bad contact.
The unit will now display whether the electrodes are 'ok' or 'bad'.

➧ It is recommended to replace electrodes twice a year.

9.3 Cable test (9).


A SYSTEM SETTINGS
A
Cable test
Connect the electrode cable to channel A and short-circuit the male connectors of the cable with the test plug.
red+
0.0 V CV
Set amplitude to 20 mA
Press 'Go back' key to go back

Important: a cable test can only be performed through channel A.

Select 'cable test' in the system settings menu.

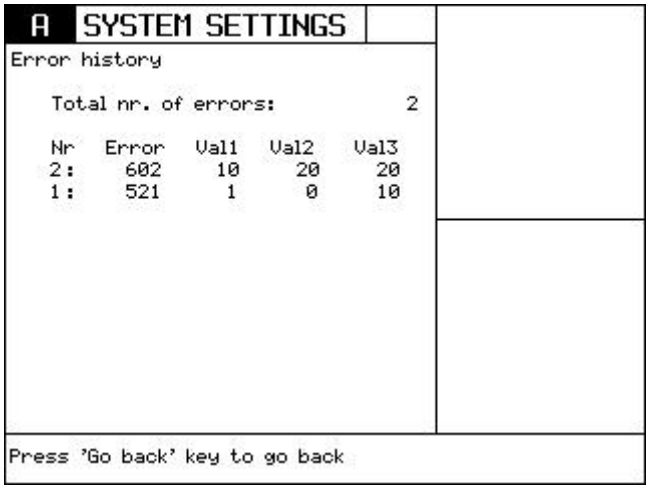
Connect the patient cable to the channel **A** (without the plate electrodes) and make a short-circuit with the supplied connector (red female-female connector)

Turn up the intensity to 10 V and move with the plugs and cable to detect a bad contact.
The unit will now display whether the cable is 'ok' or 'bad'.

Perform the same test for the other patient cables.

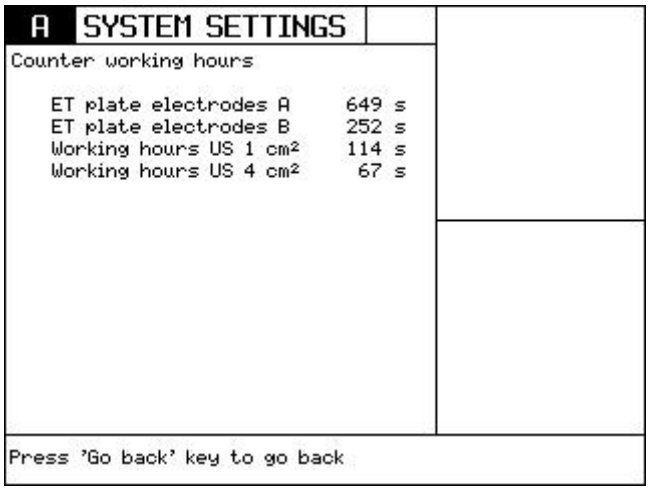
9.4 Error History(11).

This menu will give detailed information of the last 10 errors that have been occurred.
This is an important tool to detect a problem, especially when it concerns intermittent errors.
In this menu it is not possible to make a reset of the error message (since this is accessible for the customer: chapter service menus)


A SYSTEM SETTINGS
Error history
Total nr. of errors: 2
Nr Error Val1 Val2 Val3
2: 602 10 20 20
1: 521 1 0 10
Press 'Go back' key to go back

9.5 Counter working hours.

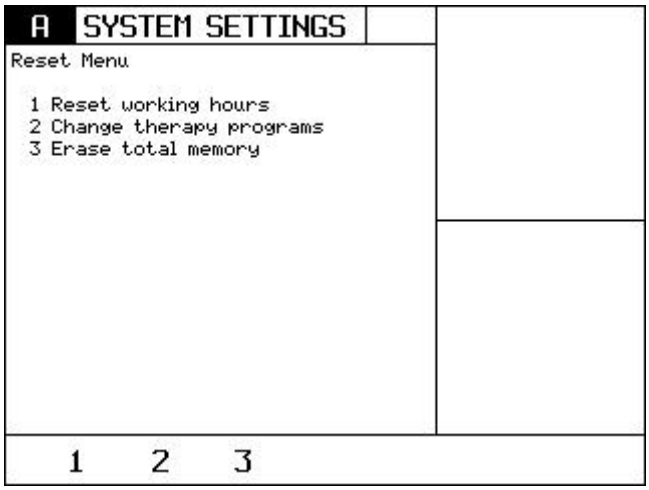
This menu gives an overview of the working hours per module (ET, US) and per channel.
It can help a service engineer to justify for example a worn-out ultrasound cable.


A SYSTEM SETTINGS
Counter working hours
ET plate electrodes A 649 s
ET plate electrodes B 252 s
Working hours US 1 cm² 114 s
Working hours US 4 cm² 67 s
Press 'Go back' key to go back

9.6 Reset menu

The reset menu offers the possibility to reset

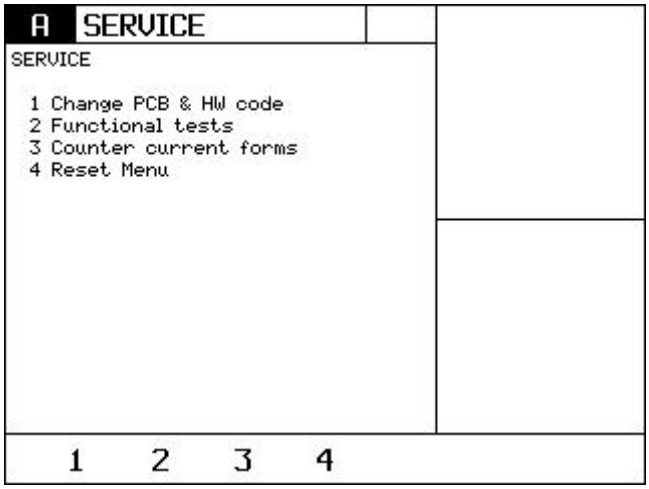
1. The working hours for each single module.
2. Restore programs to the original configuration or save a new setting (not for advised programs)
3. Clear total memory (except counter working hours and error history)



10. Service menus.

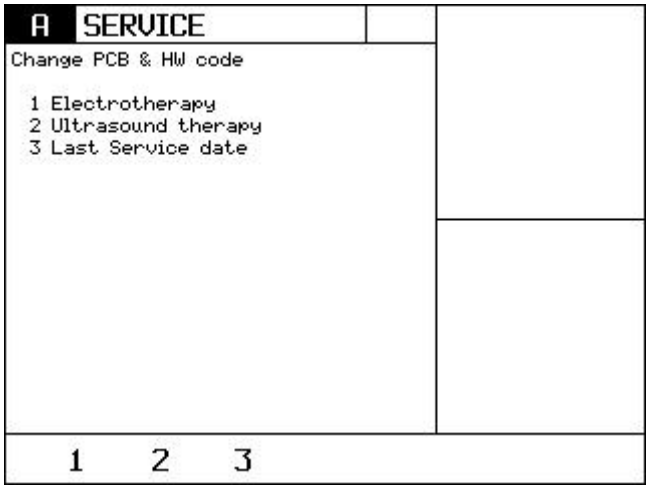
The Phyaction series have a built in service menu which allows to check different important service issues.

To enter the service menu, first go to the ‘ system settings’ menu (by pressing) and then press the ‘Pause’ key (ⓥ) for about 5 seconds. The following screen will appear.



10.1 Change PCB & HW code

This menu offers the possibility to change the hardware codes of the different PCB’s and to change the last service date.

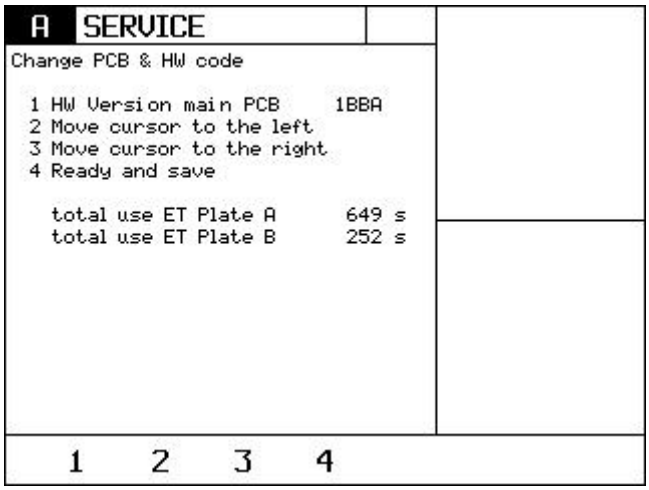


In case the hardware code of one of the boards changes for any reason, it has to be stored in the machine via this menu.

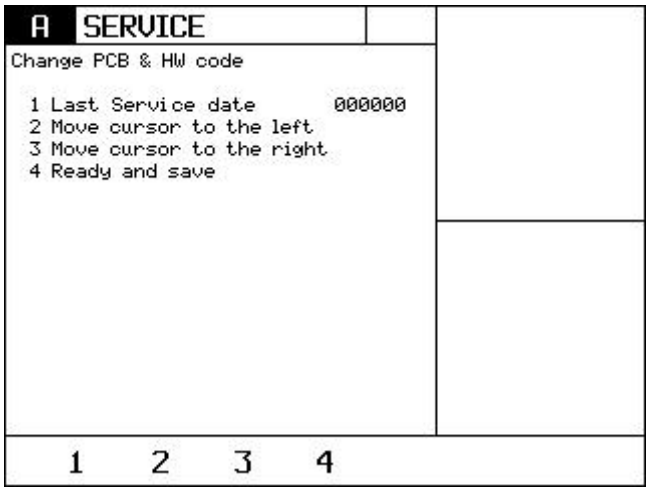
In case of replacing the main PCB, the hardware codes of all the other PCB’s have to be introduced again by using this menu.

➧ Each board carries a label with the hardware code.

➧ It is also possible to enter the last service date. This date will become visible in the system information menu.

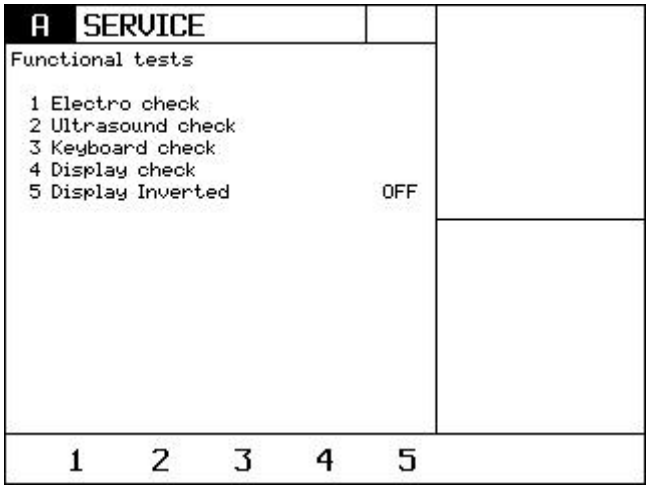

A SERVICE
Change PCB & HW code
1 HW Version main PCB 1BBA
2 Move cursor to the left
3 Move cursor to the right
4 Ready and save
total use ET Plate A 649 s
total use ET Plate B 252 s
1 2 3 4

➧ We recommend to input the Last service date after each checkup or repair of the machine.


A SERVICE
Change PCB & HW code
1 Last Service date 000000
2 Move cursor to the left
3 Move cursor to the right
4 Ready and save
1 2 3 4

10.2 Functional tests

The functional test offers the service engineer to check a number of important items of the machine.

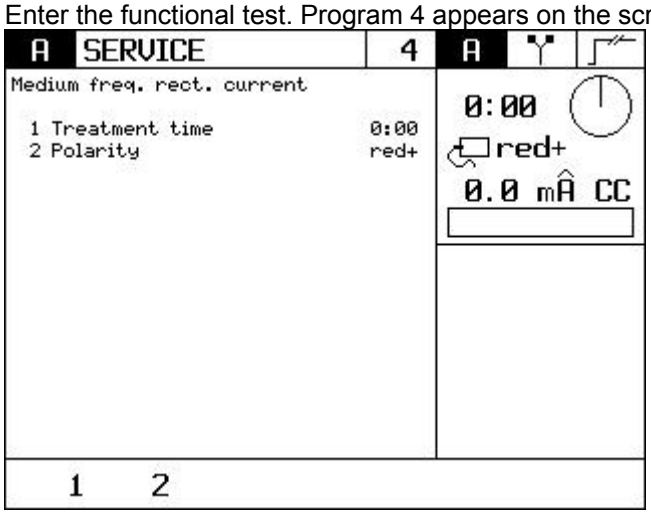


10.2.1 Electro check

After each repair or during the yearly checkup (chapter 8), 2 current wave forms have to be tested in order to make sure that the machine works fine.
This menu offers the possibility to do this in a semi-automatic way.

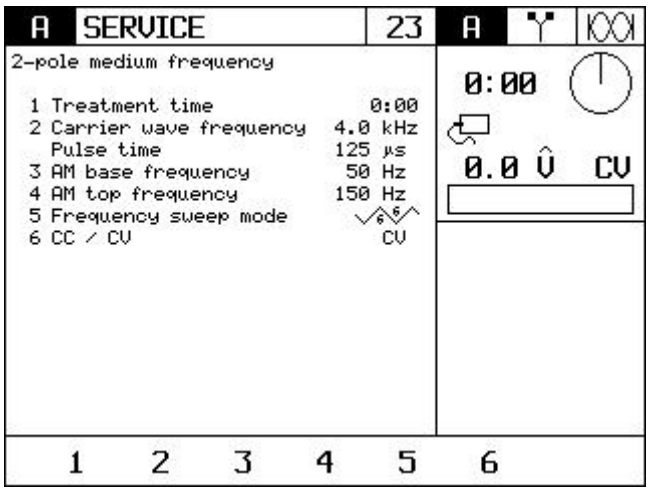
Procedure:

Enter the functional test. Program 4 appears on the screen:



Current test 1

After testing this current waveform, press the go back key and re-enter the same menu.
Program 23 appears on the screen:

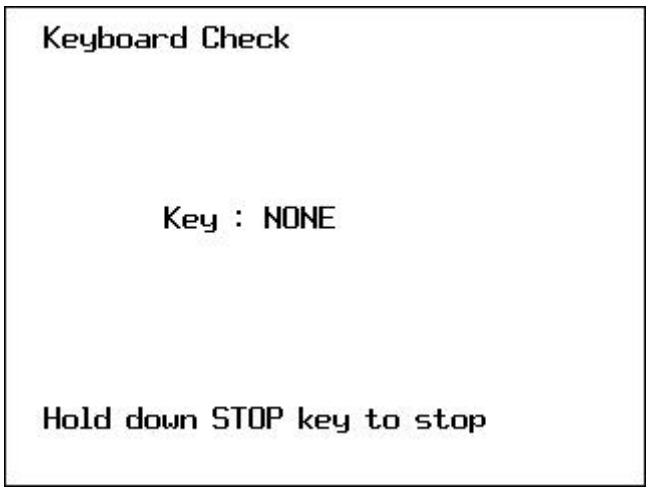

A SERVICE 23 A
2-pole medium frequency
1 Treatment time 0:00
2 Carrier wave frequency 4.0 kHz
Pulse time 125 µs
3 AM base frequency 50 Hz
4 AM top frequency 150 Hz
5 Frequency sweep mode
6 CC / CV CV
0:00
0.0 Û CV
1 2 3 4 5 6
Current test 2

10.2.2 Ultrasound check

The ultrasound check offers the possibility to check the ultrasound module for a longer period (without timer).

10.2.3 Keyboard check

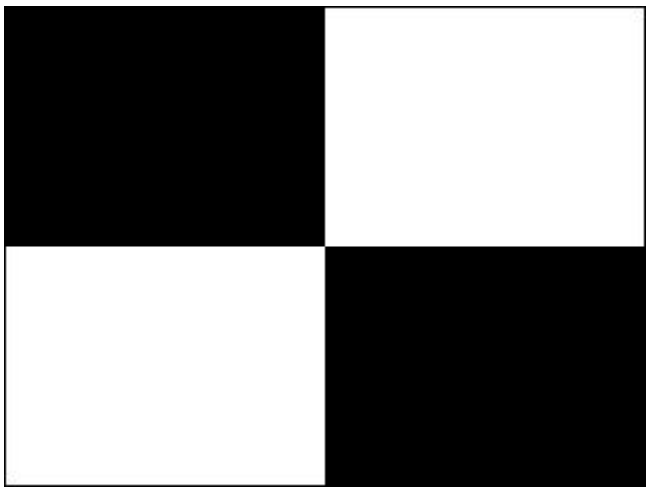
All the different keys can be tested in this mode.
When pressing a key, the machine must react immediately.



Hold down the STOP key for about 5 sec in order to return to the functional test menu.

10.2.4 Display check

Offers the possibility to check the screen for defective or missing pixels.



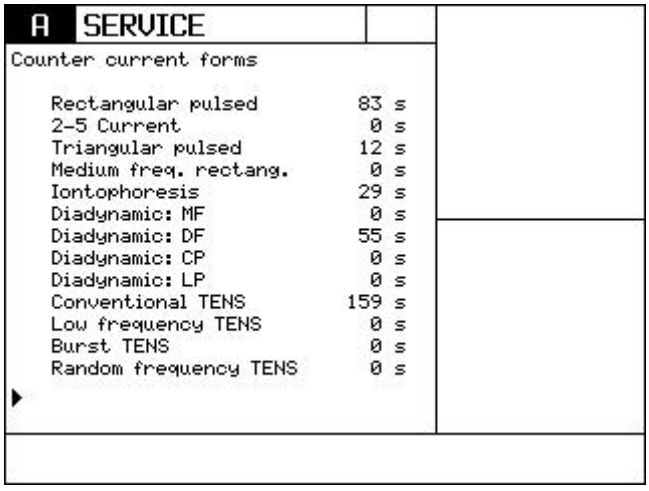
10.2.5 Invert screen

Offers the possibility to invert the complete screen.

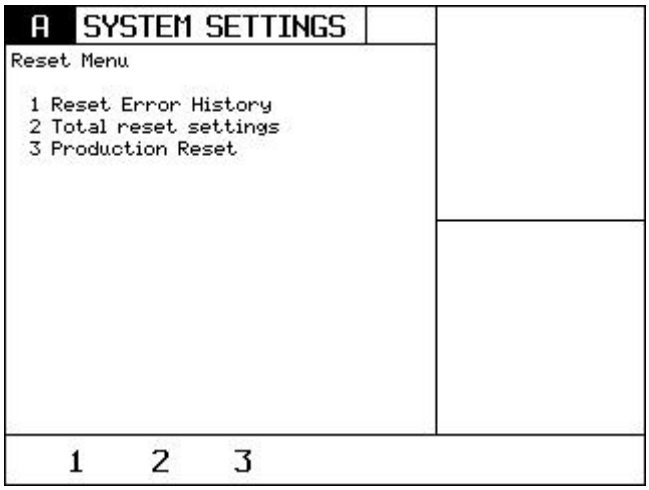
10.3 Count currents.

Sometimes it might be interesting to know what current types the customer is using the most frequently in order to simulate intermittent problems.

This menu gives an overview of the total working hours per current waveform.



10.4 Reset menu



10.4.1 Reset error history

By pressing this key twice, the error history will be restored.

10.4.2 Total reset settings.

By pressing this key twice, a total reset of the machine is executed.

The total reset settings menu makes a reset off ALL the previous settings and information (like working hours and error history)

Since some boards are being used in several machines, we have an auto detection system. If we provide a main board, we have done a total reset of all settings. When the board is replaced and the machine is switched on for the first time, the screen below appears:
(example below of the Phyaction U)

GYMNA-UNIPHY PRODUCT INFORMATION

ELECTROTHERAPY: Y
ULTRASOUND: Y
LASER: N
MYO: N
INTERFERENTIAL N
GYMNA/UNIPHY: U

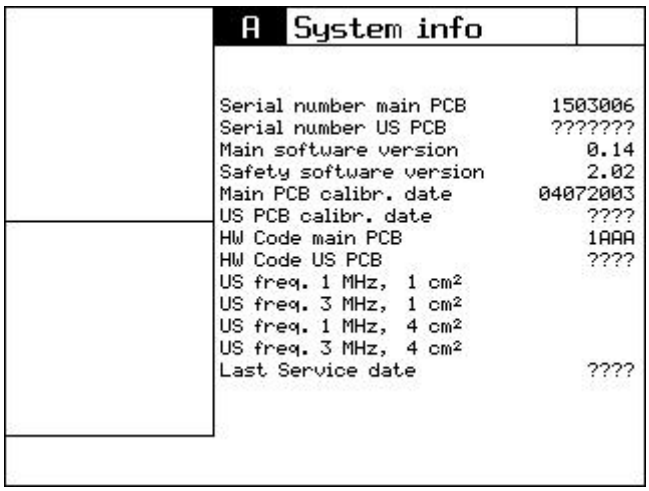
Determined type: Phyaction C

Press ‘back’ to confirm or any other key to reject

Check whether the determined type in correct and confirm with the go back key.

➧ Every main PCB that GymnaUniphy provides, had a ‘total reset’ of it’s parameters. It is normal that the screen above appears when the unit is switched on for the first time

Now the following screen appears:


A System info
Serial number main PCB 1503006
Serial number US PCB ???????
Main software version 0.14
Safety software version 2.02
Main PCB calibr. date 04072003
US PCB calibr. date ????
HW Code main PCB 1AAA
HW Code US PCB ????
US freq. 1 MHz, 1 cm²
US freq. 3 MHz, 1 cm²
US freq. 1 MHz, 4 cm²
US freq. 3 MHz, 4 cm²
Last Service date ????

Now all the hardware codes of the boards have to be introduced in the service menu (Chapter 10.1).
Therefore the unit needs to be opened.
Each board carries a label with the hardware code.

➧ This can only be done by a qualified service engineer.

Press the ‘go back’ key after all the data is correct. Now the system settings menu appears.
Change the settings if required.
Now perform a complete check-up of the machine.

11. Upgrading system software.

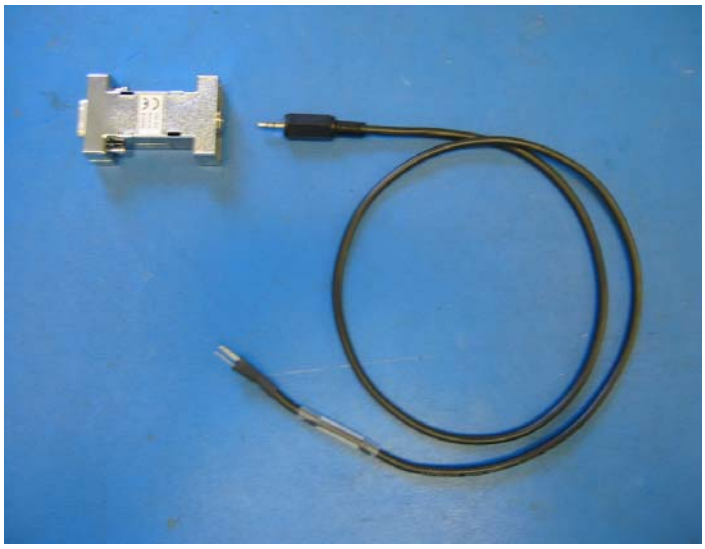
11.1 General information.

The software of the Phyaction series can easily be updated.
There is a flash memory on the main PCB that can be reprogrammed using a special interface tool.

➧ The Medical Device Directive does not allow end users to reprogram medical devices. This is only reserved to authorized service personnel.

11.2 Which tools are required ?

A PC with Windows 98/98SE/Millenium/NT/XP, CD-rom drive and a free COM/USB port.
The file with the software to be programmed (provided on CD rom)
An USB to RS232 converter when the PC has no RS232 output connector.
A special interface cable (photo below) ordering ref 117.135
A RS232 transceiver (photo below) ordering ref 117.006



Transceiver + interface cable

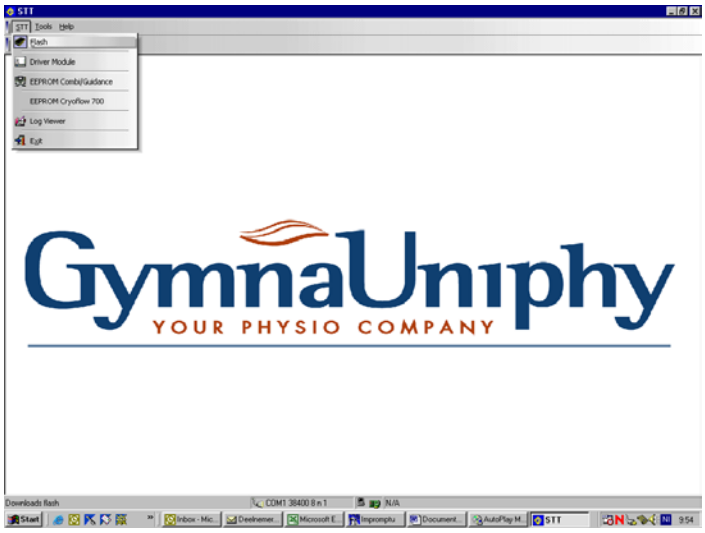
11.3 Downloading the software.

Please follow the steps below in detail:

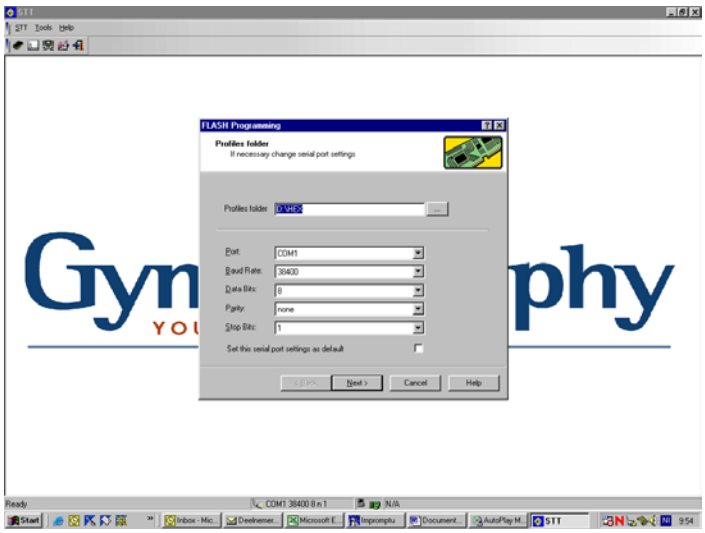
Step 1: remove the rubber foot on the right front corner (photo below)

Step 2: plug in the interface cable through the hole of the rubber foot (mind the position of the cable !)

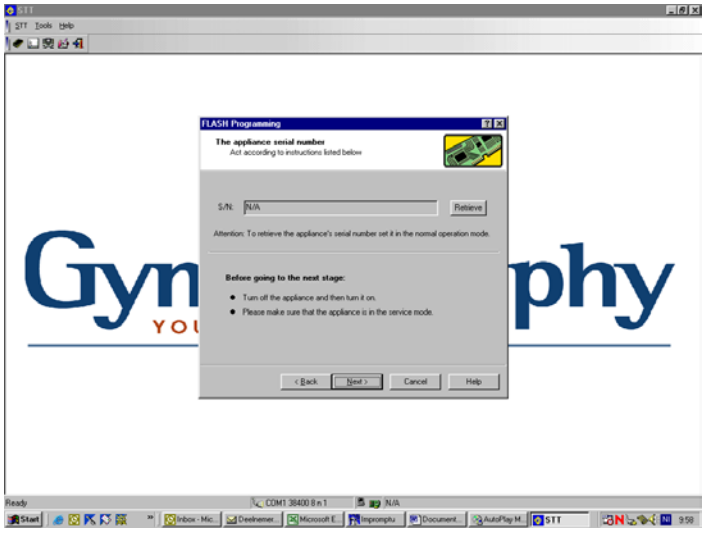
Step 3: Switch on the unit.
Step 4: connect the transceiver to the cable and the PC
Step 5: Open the STT (service test tool) program



Step 6: Select STT → Flash. The following screen appears.

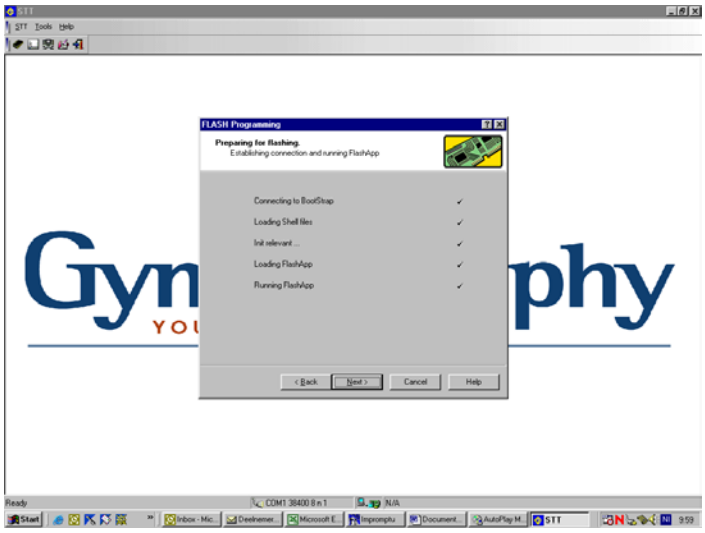


Step 7: Select the COM port → Next. The following screen appears.


FLASH Programming
The appliance serial number
Act according to instructions listed below
S/N:
N/A
Retrieve
Attention: To retrieve the appliance's serial number set it in the normal operation mode.
Before going to the next stage:
Turn off the appliance and then turn it on.
Please make sure that the appliance is in the service mode.
< Back
Next >
Cancel
Help

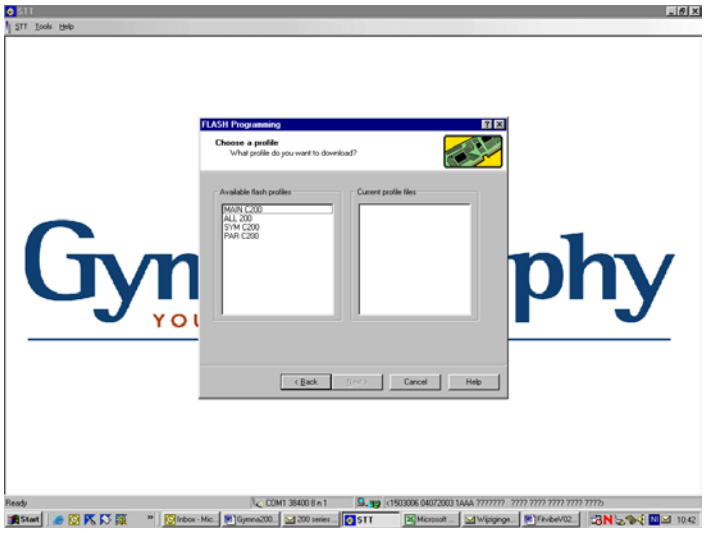
Switch off the unit, wait for 3 seconds and switch it on again.

Step 8: Select Next. The following screen appears. This is the preparation step for the flash. After a short time the different points must all be marked with a √. If a red cross appears, check the connections.

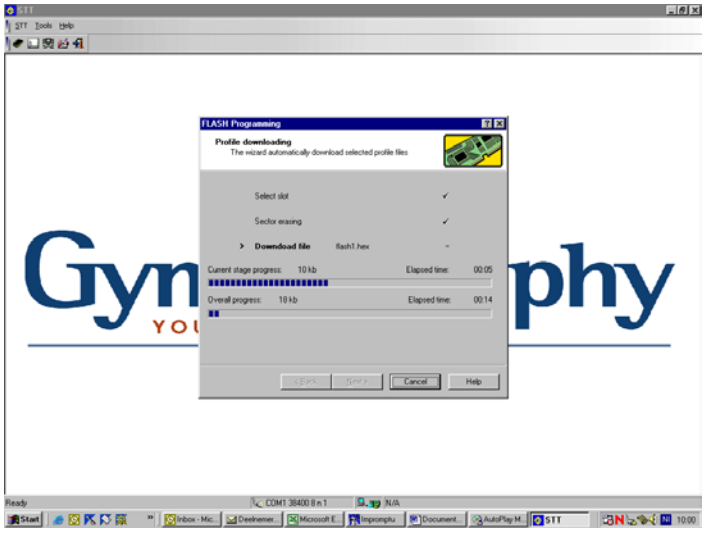


➧ The unit now displays the message: STATE: CONNECTED

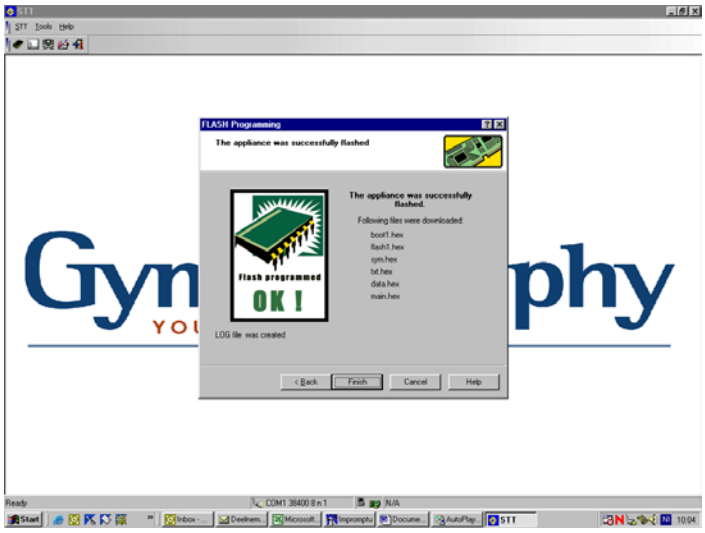
Step 9: Click next and in the list ‘available flash profiles’ select ‘ALL 200’ and click ‘Next’



Step 10: The flash procedure must now start. The following screen appears:



This will take about 7 minutes. When the flashing is finished, click on the button ‘NEXT’. The following screen must appear:



If the flashing was terminated successfully, switch off the unit . Now close the program, remove the flash cable and install the rubber foot.
Switch on the unit. The new software is now installed.

➧ Check the software version in the start-up screen.

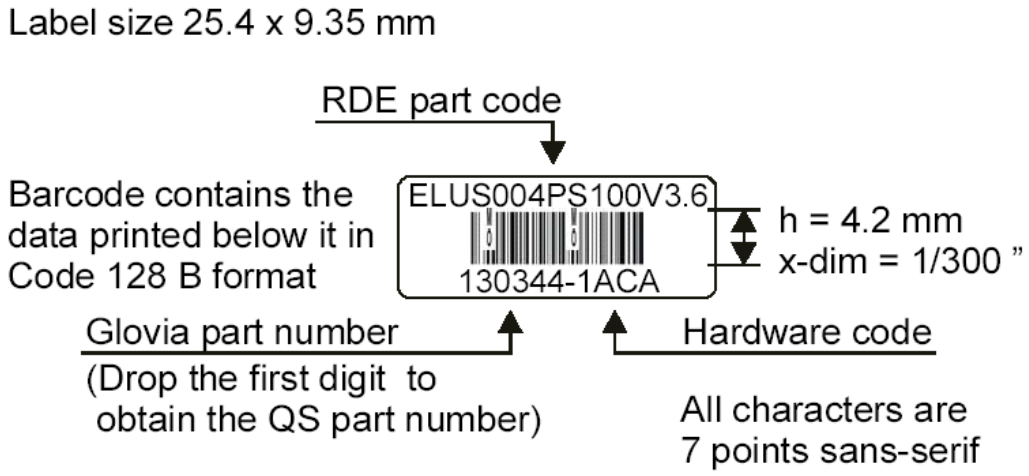
11.4 Troubles with flashing.

If the PC cannot connect to the unit, check whether the interface cable is properly connected and check whether the right COM port has been chosen.

12. Hardware labels.

Each PCB (except the display PCB and the power supply) has 2 labels, one with the hardware code and one with the serial number.

12.1 Label with hardware code and ref number.


Label size 25.4 x 9.35 mm
RDE part code
Barcode contains the data printed below it in Code 128 B format
ELUS004PS100V3.6
130344-1ACA
h = 4.2 mm
x-dim = 1/300 ”
Glovia part number
(Drop the first digit to obtain the QS part number)
Hardware code
All characters are 7 points sans-serif

The main PCB has an eeprom in which the actual hardware code of the used PCB is saved.

The hardware code consists of 4 characters and is composed as follows (from left to right):

0…	From 1 to 9.	Increase in case of a principle technology change.	Hardware is not compatible anymore. All previous changes made in hardware shall be inherited in the new layout. The last 3 alphanumerical numbers will begin with A
.A..	A to Z	Increase in case of a principle technology change.	Components are not anymore compatible with the previous layout. All previous changes made in hardware shall be inherited in the new layout. The last 2 alphanumerical numbers will begin with A
..A.	A to Z	Increase in case of component change.	
…A	A to Z	Increase in case of a PCB track change.	

Example:

Suppose that resistor R68 changes from 22 K to 100 K.
The actual hardware version 1AAA will be upgraded to 1ABA.

12.2 Upgrading the hardware code.

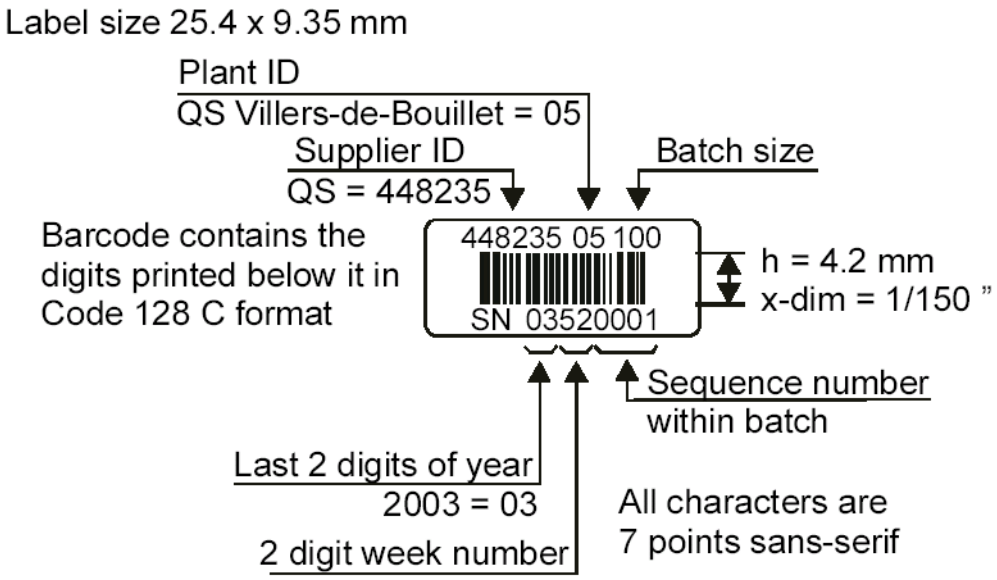
Every hard-or software change will be presented in a technical bulletin. In case of a hardware change GymnaUniphy will provide the necessary components as well as a new hardware label. This label must be put on the upgraded PCB.

The hardware code also has to be modified in the serial eeprom. See chapter 10.1 for more details.

➧ The user can easily see the hardware code of each PCB in the system settings menu.

12.3 Label with serial number

Critical parts must be traceable meaning it must be identifiable at least on lot level for source and destination. To end this, critical parts must be labeled.


Label size 25.4 x 9.35 mm
Plant ID
QS Villers-de-Bouillet = 05
Supplier ID
QS = 448235
Batch size
Barcode contains the digits printed below it in Code 128 C format
448235 05 100
SN 03520001
h = 4.2 mm
x-dim = 1/150 ”
Sequence number within batch
Last 2 digits of year
2003 = 03
2 digit week number
All characters are 7 points sans-serif

13. Troubleshooting.

13.1 General information.

In case of a problem the unit will produce an error code. Intermittent error codes can be recovered by means of the service software, which gives an overview of the last 10 error codes.

13.2 Skipping the self test

When the error code is generated during the self test, and the cause of the problem is difficult to detect, there is a possibility to skip the self test.

When starting up the machine, press the function keys F1 and F7 at the same time. The self test will now be skipped.

13.3 De-activate the safety relay (only for Phyaction I/E/C)

In order to deactivate the control of the safety relay, the position of the jumper 'operate/service, located on the ET board, must be put from position 'OPERATE' to position 'SERVICE'. Putting the jumpers into 'SERVICE' position will avoid that the safety relay can be switched off.

Since the functioning of the safety relay is tested during the selftest, it will generate an error code when the unit is in 'SERVICE' mode.
Therefore the selftest must be bypassed (13.2: skip of self test)

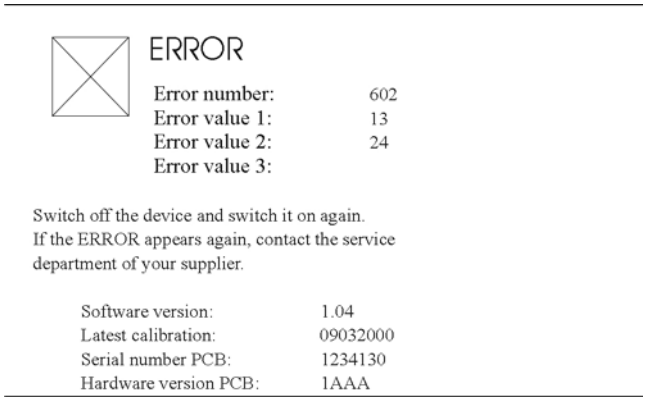
After both the 'SERVICE' jumper and the factory jumper are changed, the unit can be powered up without performing a selftest and without the possibility to deactivate the safety relay.

➧ It is very important that after repairing the unit, the unit will be reset to 'OPERATE' Not following this instruction can bring the safety of the patient and the therapist in jeopardy.

In case the service engineer cannot solve the problem, it is recommended to communicate the problem with the GymnaUniphy service department.

13.4 Interpreting error codes.

In case of an error, the following screen appears:


ERROR
Error number: 602
Error value 1: 13
Error value 2: 24
Error value 3:
Switch off the device and switch it on again.
If the ERROR appears again, contact the service department of your supplier.
Software version: 1.04
Latest calibration: 09032000
Serial number PCB: 1234130
Hardware version PCB: 1AAA

The unit gives an overview of the actual error. The error code can be traced in the error list (chapter 12).

Different codes:

Error number: defines the software module in which the error is detected.
Error value 1: the first error value which defines the individual test in the module which actually generated the error
Error value 1: an additional value which may give more information about the detected error.
Error value 2: (not used).

13.5 List of error codes.

This chapter defines the individual error numbers. Each error number is related to a software module. For each error number the code used in the software is defined, the number is defined and a short description about the purpose of the software module is given.

13.6 Error groups

Error group	Error group description
1 - 99	Driver errors
100 - 199	Operating system errors
200 - 299	Elektro task errors
300 - 399	Ultrasound task errors
400 - 499	Laser task errors
500 - 599	User interface task errors
600 - 699	System task errors
700 - 799	Hardware Initialisation errors
800 - 899	Not used
900 - 999	Monitor service program errors
1000 - 1099	CPU error

13.7 Error list

Error Nr			Name	Description
1	1		ADC	Not used
	2			Not used
	3	[x]		Invalid ADC channel [x] selected
2			ASCDRV	Not used
3	0	0	ASCMAIN	Flash application header not OK
		1		Flash application checksum not OK
4	0	[x]	ASW	Invalid Analogue switch channel [x] selected
	1	[x]		Invalid Analogue switch channel [x] selected for Channel A
	2	[x]		Invalid Analogue switch channel [x] selected for Channel B
5			BUZ	Not used
6	1	[x]	CCR	Invalid Capture compare channel [x] selected during setting associated output pin
	2	[x]		Invalid Capture compare channel [x] selected during query for associated pin
	3	[x]		Invalid Capture compare channel [x] selected during setting associated output pin direction
7	1	[x]	CCT	Invalid Capture compare timer [x] selected
8			CHOP	Not used
9			CRC	Not used
10	1	[x]	DAC12	Invalid DAC12 Amplitude control mode [x] selected
	2	[x]		Invalid DAC12 Amplitude state [x] selected on Channel A
	3	[x]		Invalid DAC12 Amplitude state [x] selected on Channel B
	4	[x]		Invalid DAC12 Amplitude state [x] selected on Channel A & B
	5	[x]		Invalid DAC12 Amplitude Vector state [x] selected
11			DRW1353	Not used
12			DRWBM	Not used
13			DRWGR	Not used
14			DRWM	Not used
15			DRWTXT	Not used
16			DRWVIP	Not used
17	1	[x]	DS1	Invalid Dallas 1 wire OTP channel [x] selected during OTP initialisation

	2	[x]		Invalid Dallas 1 wire OTP channel [x] selected during OTP presence check
	3	[x]		Invalid Dallas 1 wire OTP read channel [x] selected during OTP read
	4	[x]		Invalid Dallas 1 wire OTP write channel [x] selected during OTP write
18			DS250X	Not used
19			FET	Not used

20	1	[x]	FRQ	Invalid Timebase controlled Frequency wave state [x] selected on Channel A
	2	[x]		Invalid Timebase controlled Frequency wave state [x] selected on Channel B
	3	[x]		Invalid MF frequency wave state [x] selected on Channel A
	4	[x]		Invalid MF frequency wave state [x] selected on Channel B
	5	[x]		Invalid LF frequency wave state [x] selected on Channel A
	6	[x]		Invalid LF frequency wave state [x] selected on Channel B
	7	[x]		Invalid Diadynamic frequency wave state [x] selected on Channel A
	8	[x]		Invalid Diadynamic frequency wave state [x] selected on Channel B
	9	[x]		Invalid Diadynamic frequency wave state [x] selected on Channel A & B
	10	[x]		Invalid Rectangular/Triangular frequency wave state [x] selected on Channel A
	11	[x]		Invalid Rectangular/Triangular frequency wave state [x] selected on Channel B
	12	[x]		Invalid Tens frequency wave state [x] selected on Channel A
	13	[x]		Invalid Tens frequency wave state [x] selected on Channel B
21			GPT1	Not used
22			GPT2	Not used
23	1	[x]	I2C	Invalid I2C channel [x] selected during I2C initialisation
	2	[x]		Invalid I2C channel [x] selected during I2C read
	3	[x]		Invalid I2C channel [x] selected during I2C write
	4	[x]		Invalid I2C channel [x] selected during I2C get time out/reset error flag
24			IMATH	Not used
25			KSC	Not used
26			LCM	Not used
27			LSIO	Not used
28	1	[x]	LFD	Invalid waveform [x] selected during setting of LF to diadynamic surge on Channel A
	2	[x]		Invalid waveform [x] selected during setting of LF to diadynamic surge on Channel B
	3	[x]		Invalid Pulse time [x] selected during setting of LF Triangular pulse time on Channel A
	4	[x]		Invalid Pulse time [x] selected during setting of LF Triangular pulse time on Channel B
	5	[x]		Invalid Amplitude state [x] selected during LF timebase controlled surge on Channel A
	6	[x]		Invalid Amplitude state [x] selected during LF timebase controlled surge on Channel B
29	1	0	LSF	Invalid laser frequency value during setting of laser frequency for MODx43
		1		Invalid laser frequency value during setting of laser frequency for MODx45
	2	[x]		Invalid laser probe type [x] during setting of laser frequency
30	1	[x]	PEC	Invalid channel [x] selected during setting of PEC channel source address
	2	[x]		Invalid channel [x] selected during setting of PEC channel destination address
	3	[x]		Invalid channel [x] selected during setting of PEC channel mode and count
	4	[x]		Invalid channel [x] selected during setting of PEC channel properties
31	1	[x]	PPI	Invalid PPI 8255 port [x] selected during PPI write
	2	1		Invalid PPI 8255 line control state during setting of PPI line
		2		Invalid PPI 8255 port selected during setting of PPI line
32	1	[x]	PWM	Invalid PWM mode [x] selected during setting of PWM mode
	2	[x]		Invalid PWM channel [x] selected during setting of PWM properties
33	1	[x]	REL	Invalid Relay [x] selected during setting of Relay lines on Channel A
	2	[x]		Invalid Relay [x] selected during setting of Relay lines on Channel B
	3	[x]		Invalid Special Relay [x] selected durring setting of special relays (Safety, Test, ..)
34	1	[x]	S4W	Invalid number of bits [x] selected during write to 4-wire bus
	2	[x]		Invalid channel [x] selected during initialisation of write to 4-wire bus

35	1	1	SC	I2C Error during start of sending I2C command to the Safety controller
		2		I2C Error during start of receiving I2C data from the Safety controller
	2	1		I2C Error during adressing while sending a command to the Safety controller
		2		I2C Error during adressing while receiving data from the Safety controller
	3	1		I2C Error during sending first part of command to the Safety controller
		2		I2C Error during sending second part of command to the Safety controller
	4	0		I2C Error during receiving bytes from Safety controller
	5	128		(0x80) Invalid Reset (not used)
		129		(0x81) Safety relay activated
		130		(0x82) Error during Selftest
		131		(0x83) 18V under voltage lock out detected (18V too low)
		132		(0x84) I2C communication time out
		133		(0x85) I2C checksum error
		134		(0x86) Invalid command scope (invalid I2C command received by Safety controller)
		135		(0x87) 2 resettable errors occurred in Safety controller
		136		(0x88) 2 channel waveform on B selected = not possible
		137		(0x89) Invalid Maximum amplitude while setting step value
		193		(0xC1) Invalid command state; Command not accepted (resettable error)
		194		(0xC2) Constant voltage CV request not accepted while setting CC/CV mode
		[x]		Undefined safety controller return code [x]
		256+[x]		(0x100 + x) Expected a 1 byte response from Safety controller ([x] = 1st received byte)
		512+[x]		(0x200 + x) Expected a 2 byte response from Safety controller ([x] = 1st received byte)
		1024+[x]		(0x400 + x) Expected a 4 byte response from Safety controller ([x] = 1st received byte)
36			SER	Not used
37			STRC	Not used
38			STST	Not used
39	1	[x]	TENS	Invalid Tens pulse mode [x] selected during setting of timer values on Channel A
	2	[x]		Invalid Tens pulse mode [x] selected during setting of timer values on Channel B
40			TMB	Not used
41	1	0	TSA	I2C Error during communication with TSA6057 (PLL on ULS board)
42	1	[x]	USD	Invalid US PWM dutycycle [x] setting (dutycycle > 100%)
	2	[x]		Invalid US PWM frequency [x] setting (frequency < 20 or > 500)
43	1	[x]	USF	Invalid US frequency setting [x] (1MHz : 500 – 1800 kHz / 3MHz : 2000 – 4000 kHz)
	2	[x]		Invalid US frequency range setting [x] (setting is not 1MHz or 3MHz)
44			USIO	Not used
45	1	[x]	USP	Too high US PWM voltage [x] setting (Vset > 5000)
	3	[x]		Measured US Calibration voltage [x] (VUS) set point 1 out of range
	4	[x]		Measured US Calibration voltage [x] (VUS) set point 2 out of range
	5	[x]		Too high US voltage [x] setting while setting VUS (VUS > 20000)
	6	0		Missing Calibration settings while setting VUS (calibration not executed)
	8	[x]		US Head ERA [x] out of range during head calibration
	9	[x]		US Calibration voltage [x] VCAL out of range during head calibration
	10	[x]		US Calibration Power PCAL [x] out of range during head calibration
	11	[x]		US Head factor [x] too high during US Head calibration
	12	[x]		US Head factor [x] too low during US Head calibration
	13	[x]		Too high Power setting [x] during US Head Set Power
	14	[x]		Unitialised Head factor [x] during US Head Set Power (Head factor = 0)
46			UTIL	Not used
47			VIO	Not used
48	1	[x]	E2P	Invalid MAIN EEPROM address [x] selected (address out of EEPROM memory range)
	2	[x]		Invalid MAIN EEPROM byte count [x] for reading bytes (count = 0 or out of range)
	3	[x]		Invalid MAIN EEPROM byte count [x] for writing bytes (count = 0 or out of range)
	4	[x]		Time out during I2C communication with MAIN EEPROM ([x] = number of retries)
	5	[x]		Too many words [x] to read from MAIN EEPROM (out of EEPROM memory range)

	6	[x]		Too many words [x] to write to the MAIN EEPROM (out of EEPROM memory range)
	7	[x]		Invalid US EEPROM address [x] selected (address out of EEPROM memory range)
	8	[x]		Invalid US EEPROM byte count [x] for reading bytes (count = 0 or out of range)
	9	[x]		Invalid US EEPROM byte count [x] for writing bytes (count = 0 or out of range)
	10	[x]		Time out during I2C communication with US EEPROM ([x] = number of retries)
	11	[x]		Too many words [x] to read from US EEPROM (out of EEPROM memory range)
	12	[x]		Too many words [x] to write to the US EEPROM (out of EEPROM memory range)
49	1	[x]	FAN	Temperature too high ([x] = measured ADC value corresponding with temperature)
50	1	0	GPIO	Invalid status of General purpose IO line during setting/resetting line
50	1	1		Invalid General purpose IO line during setting/resetting line
100			Q	Not used
200	1	[x]	E_CTRL A	Invalid Control state [x] selected
	2			Not used
	3	[x]		Invalid Waveform [x] selected
	4	[x]		Sending Tens pulse time to Safety contoller failed ([x] = pulse time from SC)

201	1	[x]	E_CTRL B	Invalid Control state [x] selected
	2			Not used
	3	[x]		Invalid Waveform [x] selected
	4	[x]		Sending Tens pulse time to Safety contoller failed ([x] = pulse time from SC)
202			E_PARA	Not used
203			E_PARB	Not used
204	0	0	E_TASK A	Unable to start ELT task for Channel A
	1	[x]		Invalid command message [x] sent from UIF task to ELT A task
	2	[x]		Invalid task state [x] for Channel A
	3	[x]		Invalid waveform [x] within task for Channel A
	4	3		ELT A message qeue full while sending messages to the UIF task
	5	[x]		ELT A sending Tens pulse time to Safety contoller failed ([x] = pulse time)
205	0	0	E_TASK B	Unable to start ELT task for Channel B
	1	[x]		Invalid command message [x] sent from UIF task to ELT B task
	2	[x]		Invalid task state [x] for Channel B
	3	[x]		Invalid waveform [x] within task for Channel B
	4	3		ELT B message qeue full while sending messages to the UIF task
	5	[x]		ELT B sending Tens pulse time to Safety contoller failed ([x] = pulse time)
300	1	[x]	U_CTRL	Invalid US control state [x]
301			U_CON T	Not used
302	1	[x]	U_HEA D	Invalid US Head OTP page [x] while reading a page from the US Head OTP
303	1	[x]	U_SCAN	Invalid UFEnd ([x]) < UFStart during US head scan measurement
	2	[x]		Too low UFStart [x] during US head scan measurement
	3	[x]		Too high UFEnd [x] during US head scan measurement
	4	[x]		Too big step : (UFEnd – UFStart) = [x] during US head scan measurement
	5	[x]		Too low Vus [x] during US head scan measurement
	6	[x]		Too high Vus [x] during US head scan measurement
304	1	[x]	U_TASK	ULS message qeue full while sending messages to the UIF task ([x]=ULS tasknr)
	2	[x]		Invalid command message [x] sent from UIF task to ULS task
400	1	[x]	L_CTRL	Invalid Laser operation state [x] while starting or stopping the Laser functionality
401	1	[x]	L_PRB	Invalid Laser OTP page [x] while reading a page from the Laser Head OTP
402	0	0	L_TASK	Unable to start the Laser task
	1	3		Laser message queu full while sending messages to the UIF task
	2	[x]		Invalid command message [x] sent from UIF task to LAS task
500	1	[x]	CNTR	Invalid Treatment state [x]
	2	[x]		Time out during stopping UIF task ([x] = current treatment state)
501			DELT	Not used
502			DFUM	Not used
503			DHLP	Not used
504			DIND	Not used
505			DISP	Not used
506			DOUT	Not used
507			DPAR	Not used
508			DSCR	Not used
509			DTAB	Not used
510			DTTL	Not used
511			DUTL	Not used
512	1	[x]	ELT	UIF message queu full while sending messages to the ELT tasks ([x] = UIF tasknr)
	2	[x]		Invalid command message [x] sent from ELT A & B task
513	1		EVC	Not used
	2	0		Invalid Program number (program number = 0)
	3			Not used
	4	0		Laser Probe type parameter missing in laser program (PAR_PROBE_TYPE_115)
	5			Not used
	6	0		Trying to start ULS funtionality while ULS hardware is not detected
	7	0		Trying to start LAS functionality while LAS hardware is not detected
514	10	[x]	EVH	Treatment state [x] not disabled while trying to activate system setting/memory menu
	11	[x]		Treatment state not disabled while using BACK while a program is selected in level [x] < 3

515			EVHP	Not used
516	16	[x]	EVHT	Invalid program number [x] while selecting a treatment or copying a program
	17	[x]		Invalid Sequence step number [x] while selecting a treatment or copying a program
517			EVIN	Not used
518	1	[x]	FK	Too many menu screen lines [x] while extracting menu screen records
519			ILST	Not used
520	1	[x]	LAS	Invalid source task (not LAS task) [x] is sending Laser message to UIF task
	2	[x]		Invalid command message [x] received from LAS task
	3	[x]		UIF message queu full while sending commands to the LAS task ([x] = UIF tasknr)

521	1	0	MEM	Error during initialising of MAIN EEPROM memory
	2	[x]		Preset Program [x] address out of MAIN EEPROM memory range during reading
	3	[x]		Error Record [x] address out of MAIN EEPROM memory range during reading
	4	[x]		Preset Program number [x] is not within the preset program number range
	5	[x]		Program [x] address out of MAIN EEPROM memory range during reading
	6	[x]		Trying to save an empty Therapy [x] to the MAIN EEPROM
	7	[x]		Trying to save a illegal Program [x] to the MAIN EEPROM
	8			Not used
	9	[x]		Trying to load an invalid Program [x] from MAIN EEPROM
	10			Not used
	11	[x]		Trying to load an invalid Preset Program [x] from MAIN EEPROM
	12	[x]		Trying to save an invalid Preset Program [x] to MAIN EEPROM
	13			Not used
522	1	0	MENU	No tree active while handling a menu event
	2	0		No menu active while handling a menu event
	3	0		No search menu number defined while searching for next menu event
	4	0		New selected menu is not defined while selecting a menu
		1		New selected menu is not defined while getting the menu program number
		2		Menu number not defined while getting the menu pointer
	5	0		Selected menu does not exist while selecting menu (current menu has no child)
		1		Selected menu does not exist while getting menu program nr
523			PAR	Not used
524			PLST	Not used
525	1	[x]	TASK	Invalid source task [x] while handling task messages from ELT, ULS, LAS …
	2	[x]		UIF message queu full while sending commands to itself ([x] = UIF tasknr)
526	1	[x]	ULS	Invalid source task (not ULS task) [x] is sending message to UIF task
	2	[x]		Invalid command message [x] received from ULS task
	3	[x]		UIF message queu full while sending commands to the ULS task ([x] = UIF tasknr)
527			VAC	Not used
528	1	[x]	WRNG	WARNING queu full while adding a warning to the warning queu ([x]= first free warning index)
529	[x]	[y]	SAFE0	Detected difference between Rotary value of Main uP [x] and Safety uP [y]
530			SAFE1	Not used
600	1	1	SYS	UIF task message queue full during broadcasting time event
		2		ELT A task message queue full during broadcasting time event
		3		ELT B task message queue full during broadcasting time event
		4		LAS task message queue full during broadcasting time event
		5		ULS task message queue full during broadcasting time event
		6		Not used
	2	0		Real time operating system : System task timer allocation failed
	3	[x]		Main controller ET error line is active ([x] = error count > 5) : Safety relay active
601	16	0	SCPU	(0x10) Internal RAM test failed : found non-zero IRAM byte after initialisation
		1		(0x10) Internal RAM test failed : found 2nd non-zero IRAM integer after initialisation
		2		(0x10) Internal RAM test failed : write & verify byte to IRAM failed
		3		(0x10) Internal RAM test failed : write & verify integer to IRAM failed
	32	1		(0x20) CPU integer multiplication error
		2		(0x20) CPU integer dividing error
	33	1		(0x21) GPT1 T3CON register is not zero
		2		(0x21) GPT1 T3IC register is not zero
		3		(0x21) GPT1 T2CON register is not zero
		4		(0x21) GPT1 T4CON register is not zero
	34	1		(0x22) GPT2 T6CON register is not zero
		2		(0x22) GPT2 T6IC register is not zero

		3		(0x22) GPT2 T5CON register is not zero
		4		(0x22) GPT2 T5IC register is not zero
		5		(0x22) GPT2 CAPREL register is not zero
		6		(0x22) GPT2 CRIC register is not zero
	35	1		(0x23) CAPCOM1 T01CON register is not zero
		2		(0x23) CAPCOM1 T0IC register is not zero
		3		(0x23) CAPCOM1 T1IC register is not zero
		4		(0x23) CAPCOM1 CCM0–CCM3 registers are not zero
		5		(0x23) CAPCOM1 CC0IC–CC15IC registers are not zero
	36	1		(0x24) ADC ADCON register is not zero
		2		(0x24) ADC ADCIC register is not zero
		3		(0x24) ADC ADEIC register is not zero
	37			(0x25) Not used
	38	0		(0x26) CPU WDTR register is not zero (watchdog timer)
	48	[x]		(0x30) Not used (see 601,80,[x])
	64	[x]		(0x40) Found non-zero EXTERNAL RAM bytes in page [x]

602	1	1	SELT	Safety controller status error at start of self test
		2		Safety controller status error after sending "selftest" command to Safety controller
		3		Safety controller status error after sending "selftest OK" command to Safety controller = Selftest not executed within 3 seconds
	2	[x]		Temperature to high at start of self test ([x] = measured ADC value)
	3	[x]		ADC reference voltage [x] out of range
	4	[x]		Wrong Safety controller software version [x]
	10	10		ET_ERROR line inactive Safety AND Main controller with Output < Safety value
		11		ET_ERROR line inactive at Safety controller only with Output < Safety value
		12		ET_ERROR line inactive at Main controller only with Output < Safety value
		20		ET_ERROR line active at Safety AND Main controller after resetting safety relay
		21		ET_ERROR line active at Safety controller only after resetting safety relay
		22		ET_ERROR line active at Main controller only after resetting safety relay
		30		Main controller unable to deactivate safety relay
		31		Safety controller unable to deactivate safety relay
		40		ET_ERROR line still active at Safety controller after setting & resetting safety relay
		50		ET_ERROR line inactive at Safety controller after resetting safety relay
		60		ET_ERROR line active at Safety controller
		71		Not used
		72		Not used
		80		ET_ERROR line active at Safety controller at Output A = 0 + Test relay active
		81		ET_ERROR line active at Safety controller at Max Output A & Max Safety value A
		82		ET_ERROR line inactive at Safety controller at Max Output A > Safety value A
		83		ET_ERROR line active at Safety controller at Output A < Safety value A = Safety relay contacts don't open (relay got stuck)
		90		ET_ERROR line active at Safety controller at Output B = 0 + Test relay active
		91		ET_ERROR line active at Safety controller at Max Output B & Max Safety value B
		92		ET_ERROR line inactive at Safety controller at Max Output B > Safety value B
		93		ET_ERROR line active at Safety controller at Output B < Safety value B = Safety relay contacts don't open (relay got stuck)
	11	0		Safety relay or Test relay contacts don't close for Channel A
	12	0		Safety relay or Test relay contacts don't close for Channel B
	13	0		Safety relay contacts don't open for Channel A
	14	0		Safety relay contacts don't open for Channel B
	15	[x]		Still current flowing after opening Test relay Channel A : Check Energize or AC/DC relay ([x] = number of retries > 3)
	16	[x]		Still current flowing after opening Test relay Channel B : Check Energize or AC/DC relay ([x] = number of retries > 3)

	20	1		ET_ERROR line active at Safety controller at Min Output A < Minimum Safety value A
		2		ET_ERROR line inactive at Safety controller at Low Output A > Minimum Safety value A
		3		ET_ERROR line active at Safety controller at Min Output B < Minimum Safety value B
		4		ET_ERROR line inactive at Safety controller at Low Output B > Minimum Safety value B
	40	[x]		LFDAC=0V/DAC12=1.5V check with ADC (CAL_A) out of range ([x] = measured value)
	41	[x]		LFDAC=0V/DAC12=0V check with ADC (CAL_A) out of range ([x] = measured value)
	42	[x]		LFDAC=1V/DAC12=Max check with ADC (CAL_A) out of range ([x] = measured value)
	43	[x]		LFDAC=0V/DAC12=Max check with ADC (CAL_A) out of range ([x] = measured value)
	44	[x]		LFDAC=0V/DAC12=1.5V check with ADC (CAL_B) out of range ([x] = measured value)
	45	[x]		LFDAC=0V/DAC12=0V check with ADC (CAL_B) out of range ([x] = measured value)
	46	[x]		LFDAC=1V/DAC12=Max check with ADC (CAL_B) out of range ([x] = measured value)
	47	[x]		LFDAC=0V/DAC12=Max check with ADC (CAL_B) out of range ([x] = measured value)
	50			Not used
	51			Not used
	60			Not used
	61			Not used
	70			Not used
	71			Not used
	72			Not used
	73			Not used
	74			Not used
	75			Not used
	80	[x]		AC current too low on Channel A ([x] = measured current) : Check AC/DC relay got stuck
	81			Not used
	82	[x]		AC current too low on Channel B ([x] = measured current) : Check AC/DC relay got stuck
	83			Not used
603			SULS	Not used
604			SLAS	Laser sensor not OK (initial voltage over sensor is too high)

700	1	1	PRODID	Invalid Product ID (sum of bits is not an even number)
	2	1		Product ID doesn’t correspond with the detected hardware (See : 700, 6, 1)
	3	1		Hardware configuration on Setup screen not accepted by user (BACK key = accepted)
	6	1		Product ID doesn’t correspond with the detected hardware
900			MPC	Not used
901			MPRD	Not used
902			MSRV	Not used
1000	80	10	CPU	(0x50) Found wrong Checksum ID for PAR in FLASH
		11		(0x50) Found wrong Checksum ID for SYM in FLASH
		12		(0x50) Found wrong Checksum ID for HLP1 in FLASH
		13		(0x50) Found wrong Checksum ID for HLP2 in FLASH
		14		(0x50) Found wrong Checksum ID for HLP3 in FLASH
		15		(0x50) Found wrong Checksum ID for HLP4 in FLASH
		16		(0x50) Found wrong Checksum ID for TXT1 in FLASH
		17		(0x50) Found wrong Checksum ID for TXT2 in FLASH
		18		(0x50) Found wrong Checksum ID for TXT3 in FLASH
		19		(0x50) Found wrong Checksum ID for TXT4 in FLASH
		20		(0x50) Found wrong Checksum ID for TXT5 in FLASH
		21		(0x50) Found wrong Checksum ID for TXT6 in FLASH
		22		(0x50) Found wrong Checksum ID for TXT7 in FLASH
	2	[x]		CPU NMI interrupt error ([x] = trap flag register)
	4	[x]		CPU Internal Stack overflow error ([x] = trap flag register)
	6	[x]		CPU Internal Stack underflow error ([x] = trap flag register)

	10	[x]		CPU Undefined Opcode/Protected instruction/Illegal instruction access, Illegal external bus access, Illegal Word operand…. ([x] = trap flag register)

14. Replacement procedures.

The most frequent service operations will be exchanging defective boards rather than repairing them.

When handling static sensitive devices such as PC boards of the Phyaction, the following precautions should be observed:

- Persons should be earthed by means of a wrist strap.
- Ground all electrical equipment, work bench, soldering iron…

Depending on the type of machine, different PCB's are installed. This chapter explains the assemble and disassemble procedures for the Phyaction C that has all of the different boards inside.

➧ After the machine has been opened for any reason, perform a complete test as prescribed in chapter

14.1 Disassemble instructions

14.1.1 Opening the unit and removing the top cover.

Step 1: switch of the unit and remove the 3 screws on the rear side.
Step2: remove the 3 screws on the bottom front side of the unit.
Step3: put the machine on a table and smoothly lift up the rear side of the top cover
Step4: unplug the 2 ultrasound connectors on the ultrasound PCB that is installed under the top cover and unplug the interface cable between the UI board and the Ultrasound board.
Step5: unplug the white flatwire cable of the display (open the white connector by sliding it to the front)
Step6: unplug the backlight connector the encoder cables and the power led cable
Step7: unplug the flatwire of the keyboard. The top cover can now be removed.

14.1.2 Removing the main PCB.

Step 1: open the unit as explained in 14.1.1
Step 2: pull out the connector between the main PCB and the power supply board.
Step 3: pull out the cable to the fan
Step 4: unscrew the metal plate that secures the ET output connectors (not for Phyaction U)
Step 5: unscrew the 9 screws that fix the board and remove it (4 screws for Phyaction U)

14.1.3 Removing the power supply board

Step 1: open the unit as explained in 14.1.1
Step 2: unplug the mains connector and the connector to the main board
Step 3: remove the 2 screws on the left side of the board and unlock the 2 black supports on the right side (don't damage any components on the board !) and take out the board.

14.1.4 Removing the ultrasound board

Step 1: open the unit as explained in 14.1.1
Step 2: remove the 4 screws of the board and unlock the 2 black supports on the right side (don't damage any components on the board !) and take out the board.

14.1.5 Removing the display PCB and/or keyboard

Step 1: open the unit as explained in 14.1.1 and put the top cover on a table.
Step 2: pull off the black knob(s) of the intensity rotary
Step 3: turn the cover, remove all the screws of the rotary's and power LED and take them out
Step 4: remove the 4 nuts (M5) of the metal cover and gently remove the metal cover by removing the cables that feed through the metal cover
Step 5: remove the display board by removing the 4 screws that secure it or remove the keyboard by pulling it out of the plastic top cover (photo 1)

Photo 1

14.2 Assembly instructions

14.2.1 Installing the display PCB and/or keyboard

Follow the steps as explained in 14.1.5 in reverse order.
Especially pay attention to the following points:

- A new display might have a protecting film. Remove it first
- Make sure that the display and the screen is 100% clean before assembling it.
- Don't forget to put the plastic washers on the 4 screws of the display boards
- Only use the self securing nuts to fix the metal cover
- Make sure that all the cables that are feed through the metal cover are free and show not any damage (photo 2)
- Make sure that the rotary encoders and the power led PCB are fitted in a way that the cable connections are face to face !!!
- After installation check whether the power LED is exactly behind the window in the front.

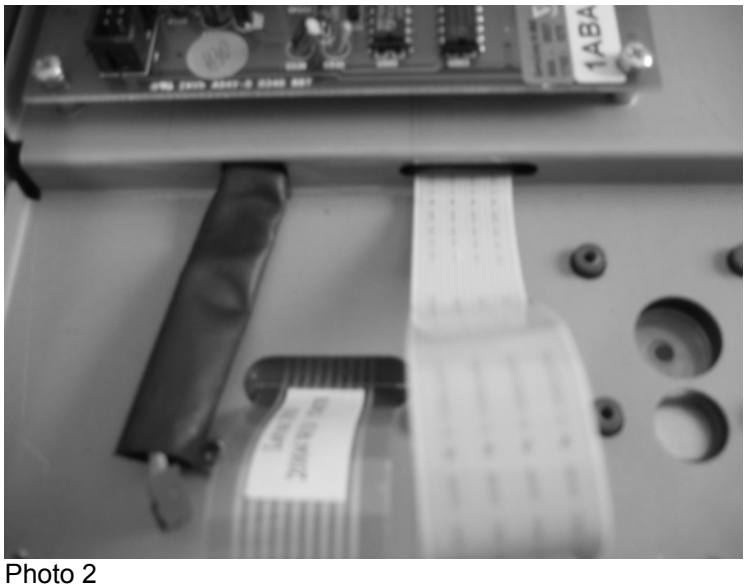


Photo 2

14.2.2 Installing the ultrasound board

Follow the steps as explained in 14.1.4 in reverse order.
Especially pay attention to the following points:

- Mind the position of the ultrasound board
- Don't touch the coils of the ultrasound board

14.2.3 Installing the power supply board

Follow the steps as explained in 14.1.3 in reverse order.
Especially pay attention to the following points:

- Mind the position of the power supply board
- Make sure that the special metal washer on the left front side of the board is well fixed (photo 3)
- After putting the board on the plastic support, check whether the board is well fixed by pulling it up.
- Make sure that the connectors all well plugged in.

Photo 3

14.2.4 Installing the main PCB.

Follow the steps as explained in 14.1.2 in reverse order.
Especially pay attention to the following points:

- Don't forget to put the metal washer on each screw point (between the board and the screw)
- Make sure that the ET output LED's are properly fit through the hole in the chassis (photo 4)
- Don't forget to fit the metal plate that secures the ET output connectors (photo 4)

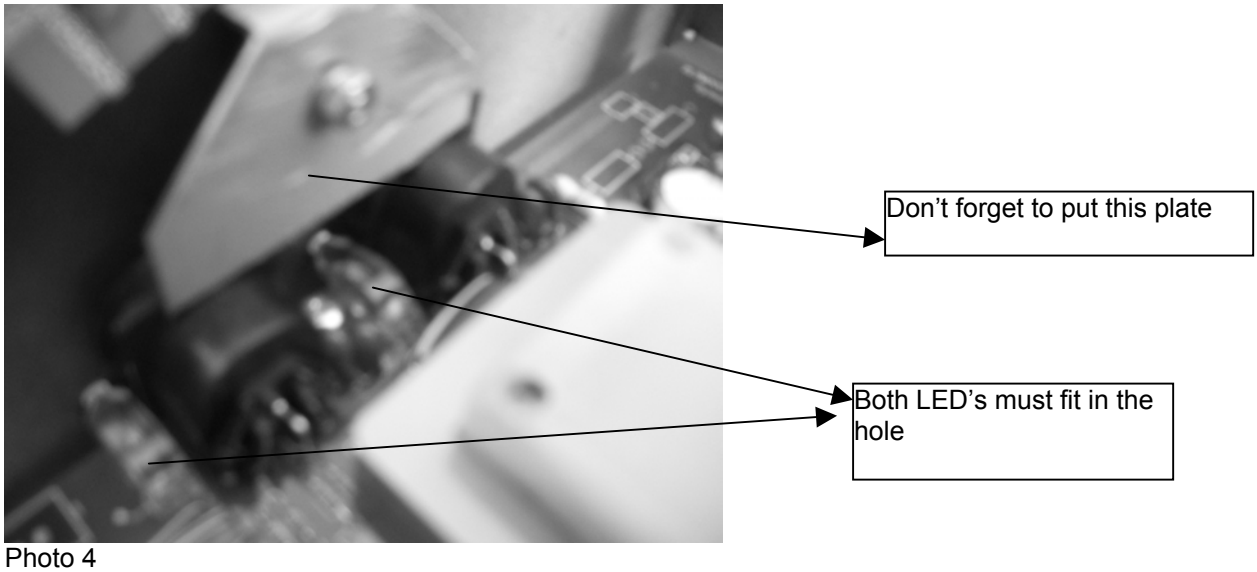


Photo 4

14.2.5 Closing the unit and installation of the top cover.

Follow the steps as explained in 14.1.1 in reverse order.
Especially pay attention to the following points:

- On each connector of the main board there is an indication of the use of the connector. Make sure that connectors are not mixed.
- The cables of the Ultrasound output have to be fit UNDER the interface cable of the ultrasound board
- When closing the cover, make sure that the cover fits onto the bottom without pushing it. If this is necessary, check the wires for proper installation.

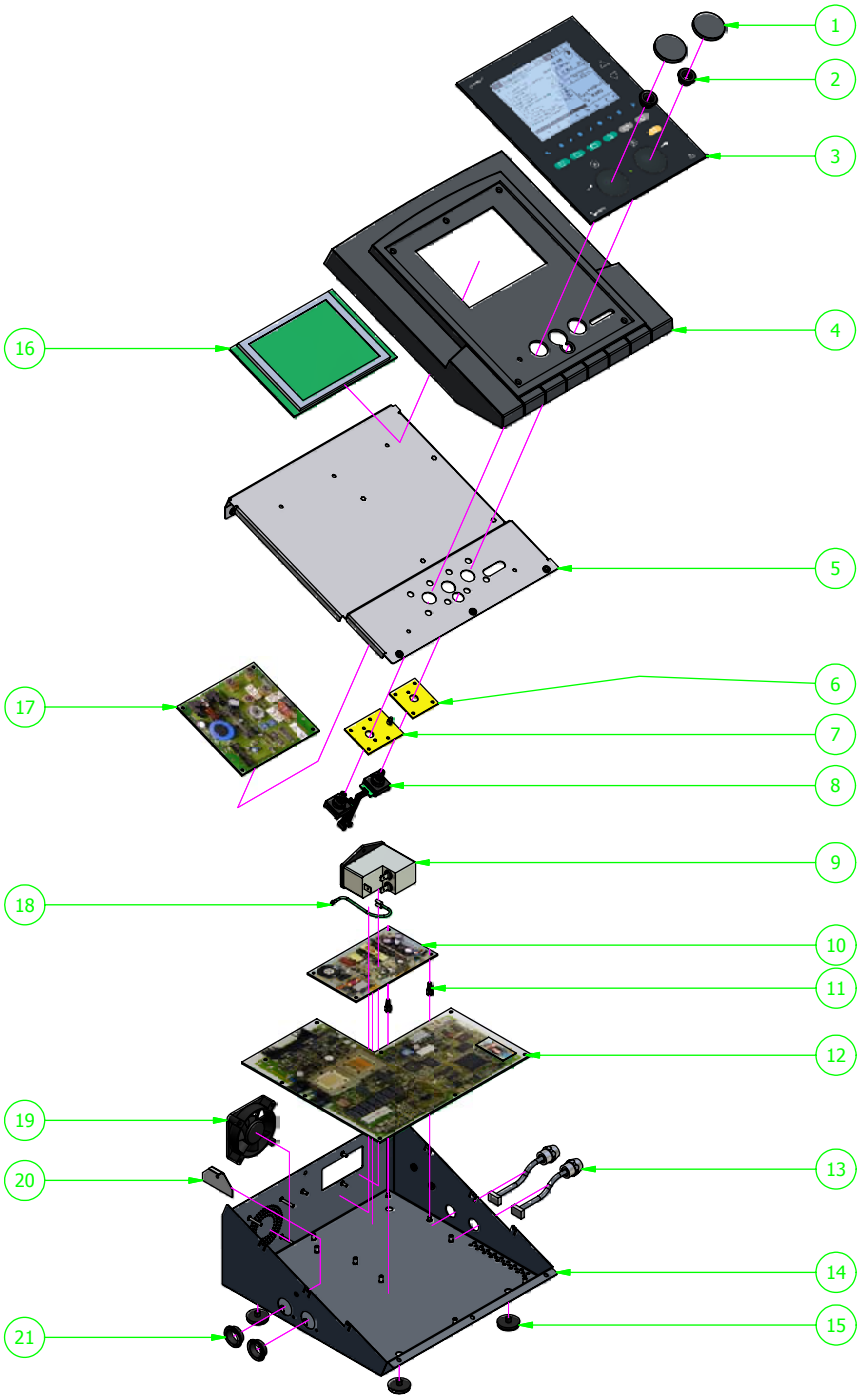
15. Compatibility of boards and components

The boards and components of the Phyaction series are not always interchangeable between the different units.
The following table gives an overview of the items that are not compatible. All the items that are not indicated in this list are fully compatible:

Ref	Item	Phyaction C	Phyaction E	Phyaction I	Phyaction U
117.162	Ultrasound PCB C/P 200&Phyaction U/C:	x			x
322.517	Main PCB Phyaction U:				x
322.528	Main PCB Phyaction E/C:	x	x		
324.914	Main PCB Phyaction I:			x	

16. Exploded views and spare parts

The most important spare parts are listed in the exploded views on the next pages. A more detailed list can be found on the service CD.



Pos	Qty	Art. Nr.	TITLE	Detail
21	2	117.146	RUBBER RING, ET OUTPUT, 200-SERIES & PHY. I/E/C	
20	1	117.142	FIXING PLATE ET CONNECTORS, C/D.200 & PHY. I/E/C	SHEET 3
19	1	117.102	FAN, 200-SERIES & PHY. I/E/C/U	
18	1	117.148	CABLE ASSY MAINS INLET, BOX EARTH, 200-SERIES & PHY. I/E/C/U	
17	1	117.162	ULTRASOUND PCB., C/P.200 & PHY. C/U	
16	1	138.404	LCD DISPLAY, QVGA, BLUE, GUID. C/E & PHY. I/E/C/U	
15	4	117.144	FOOT PLUG, 200-SERIES & PHY. I/E/C/U	
14	1	322.627	LOWER METAL HOUSING, PHYACTION C	
13	2	322.737	CUS. OUTPUT CABLE ASSY, PHY. C/U	
12	1	322.528	MAIN PCB., PHYACTION E/C	
11	2	117.152	SCREW PLASTIC/MOUNT PCB SUPPORT, 200-SERIES & PHY. I/E/C/U	SHEET 3
10	1	116.954	POWER SUPPLY 200-SERIES & PHY. I/E/C/U	SHEET 3
9	1	130.015	AC INLET GYMNA, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
8	2	131.559	ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	SHEET 2
7	1	322.715	ENCODER SUPPORT+LED, PHYACTION I/E/C/U	SHEET 2
6	1	117.143	ENCODER SUPPORT, 200-SERIES & PHY. I/E/C	SHEET 2
5	1	322.660	UPPER HOUSING PLATE (Metal), PHY. I/E/C/U	
4	1	322.616	UPPERHOUSING (No keyboard), PHY. I/E/C/U	
3	1	322.671	KEYBOARD, PHYACTION C	
2	2	117.145	RUBBER RING, ENCODER, 200-SERIES & PHY. I/E/C/U	
1	2	322.726	KNOB/ ENCODER, PHYACTION I/E/C/U	

Sheet : 1 / 3 | **Fiche nr.:**

General tol.: | **Material:** | **Surface treatment:**

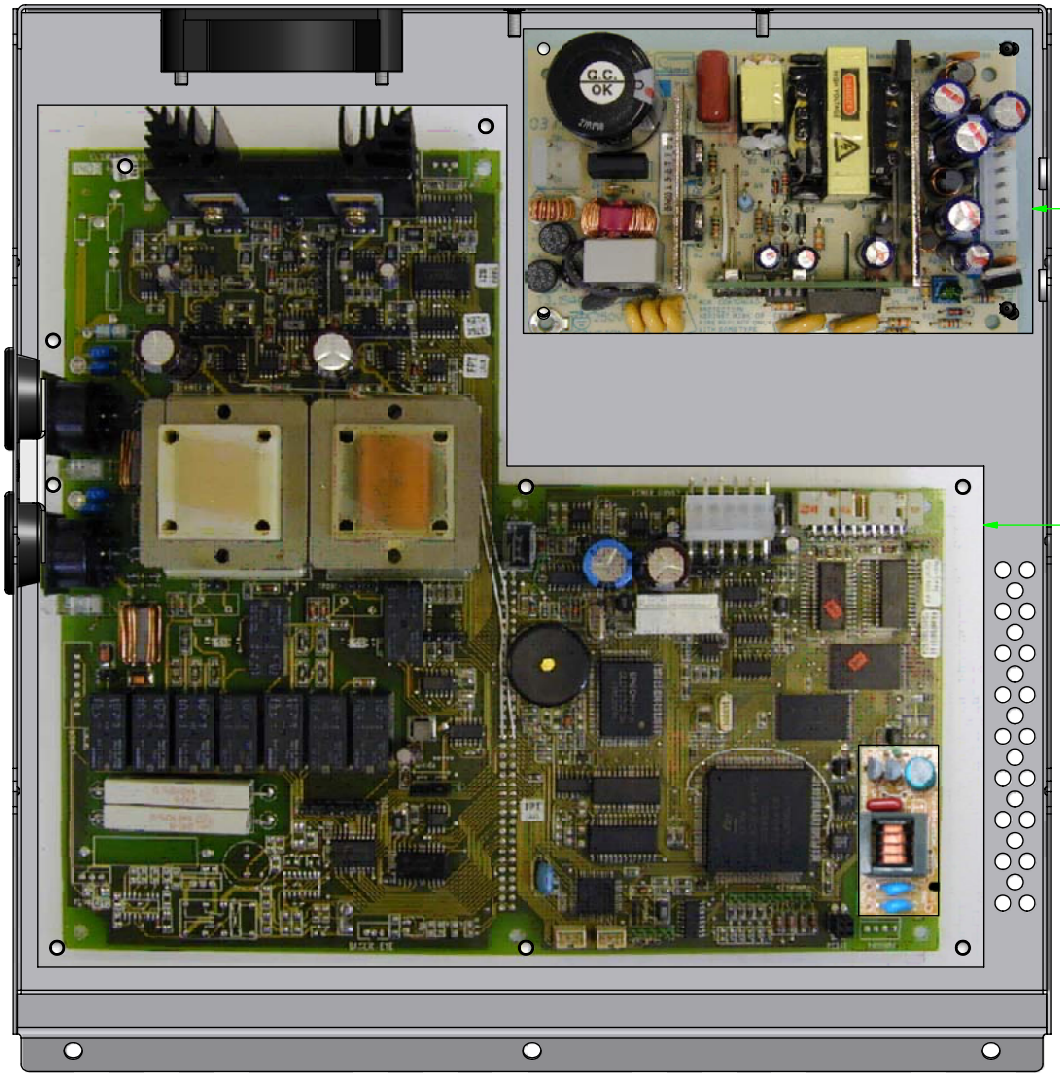
GymnaUniphy

TITLE: EXPLODED VIEW Phyaction C

Art. nr.: 323.221

Filename: Phyaction C

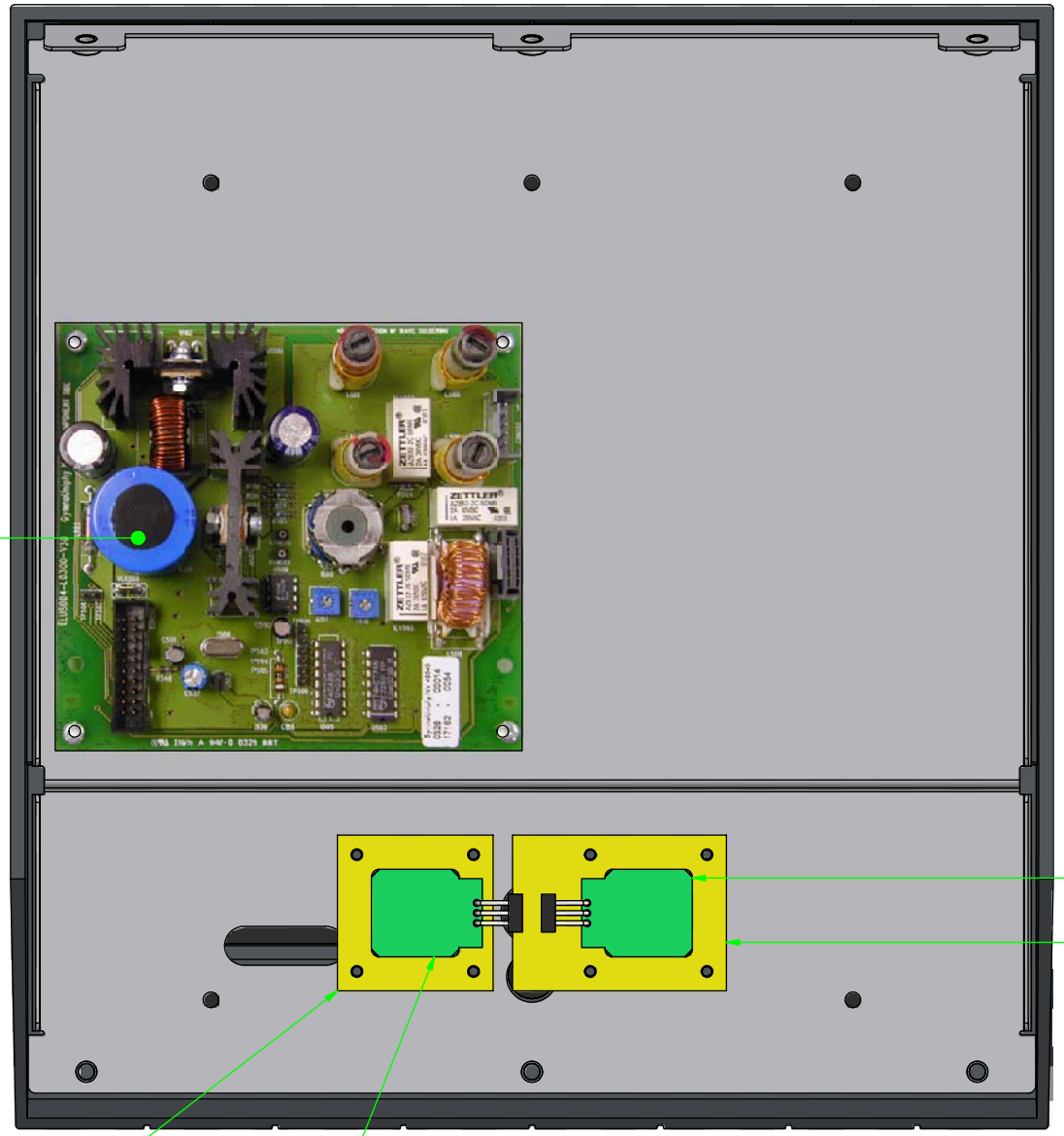
A3 | **Scale:** | **Designed by:** Steph Collart | **Date:** 06/05/2004



116.954
POWER SUPPLY 200-SERIES & PHY. I/E/C/U

322.528
MAIN PCB., PHYACTION E/C

Sheet : 2 / 3		**Fiche nr.:**
General tol.:	**Material:**	**Surface treatment:**
GymnaUniphy	EXPLODED VIEW Phyaction C	**Art. nr.:** 323.221
	TITLE:	**Filename:** Phyaction C
A3	**Scale:** **Designed by:** Steph Collart	**Date:** **06/05/2004**



117.162
ULTRASOUND PCB., C/P.200 & PHY. C/U

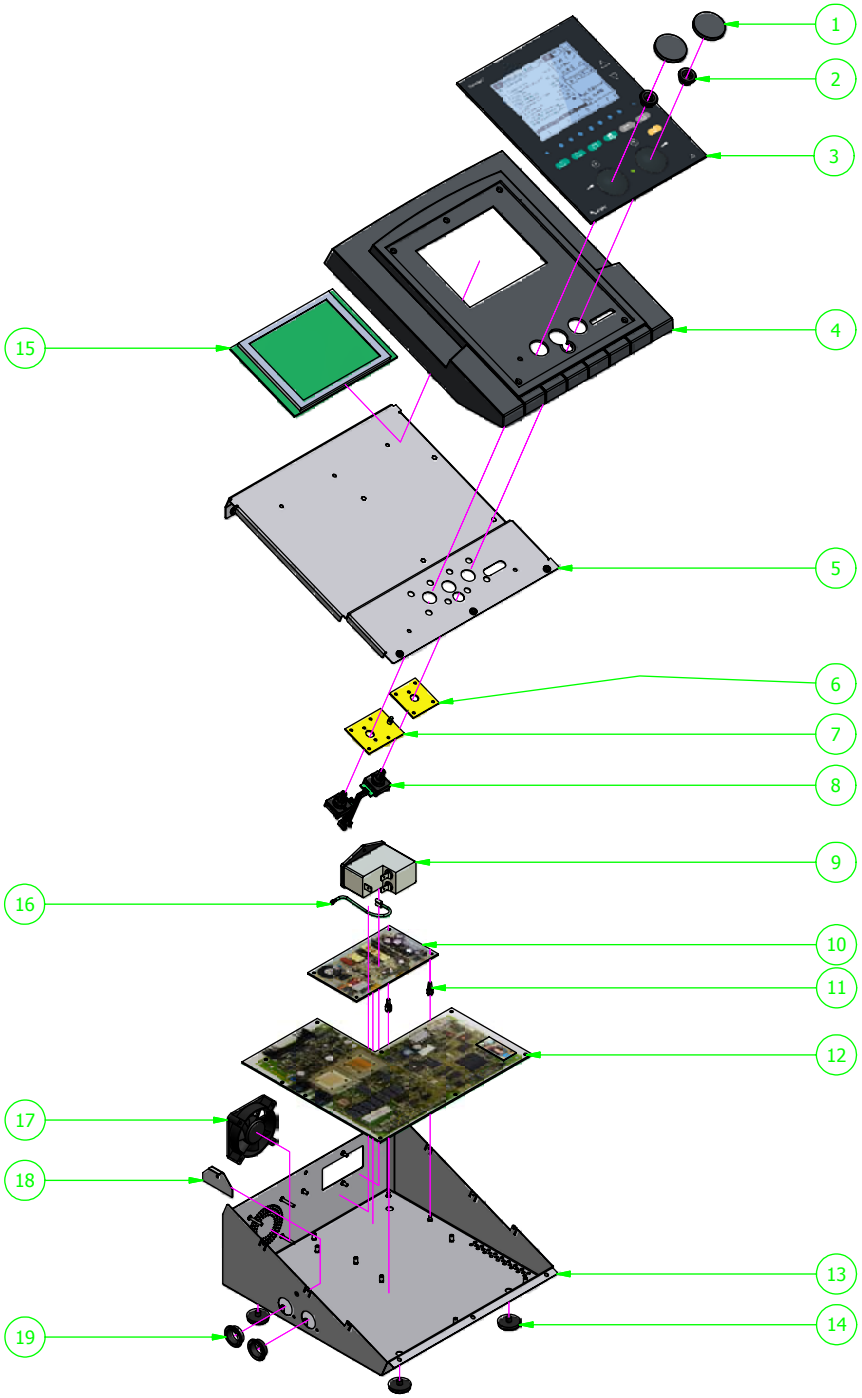
131.559
ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U

322.715
ENCODER SUPPORT+LED, PHYACTION I/E/C/U

117.143
ENCODER SUPPORT, 200-SERIES & PHY. I/E/C

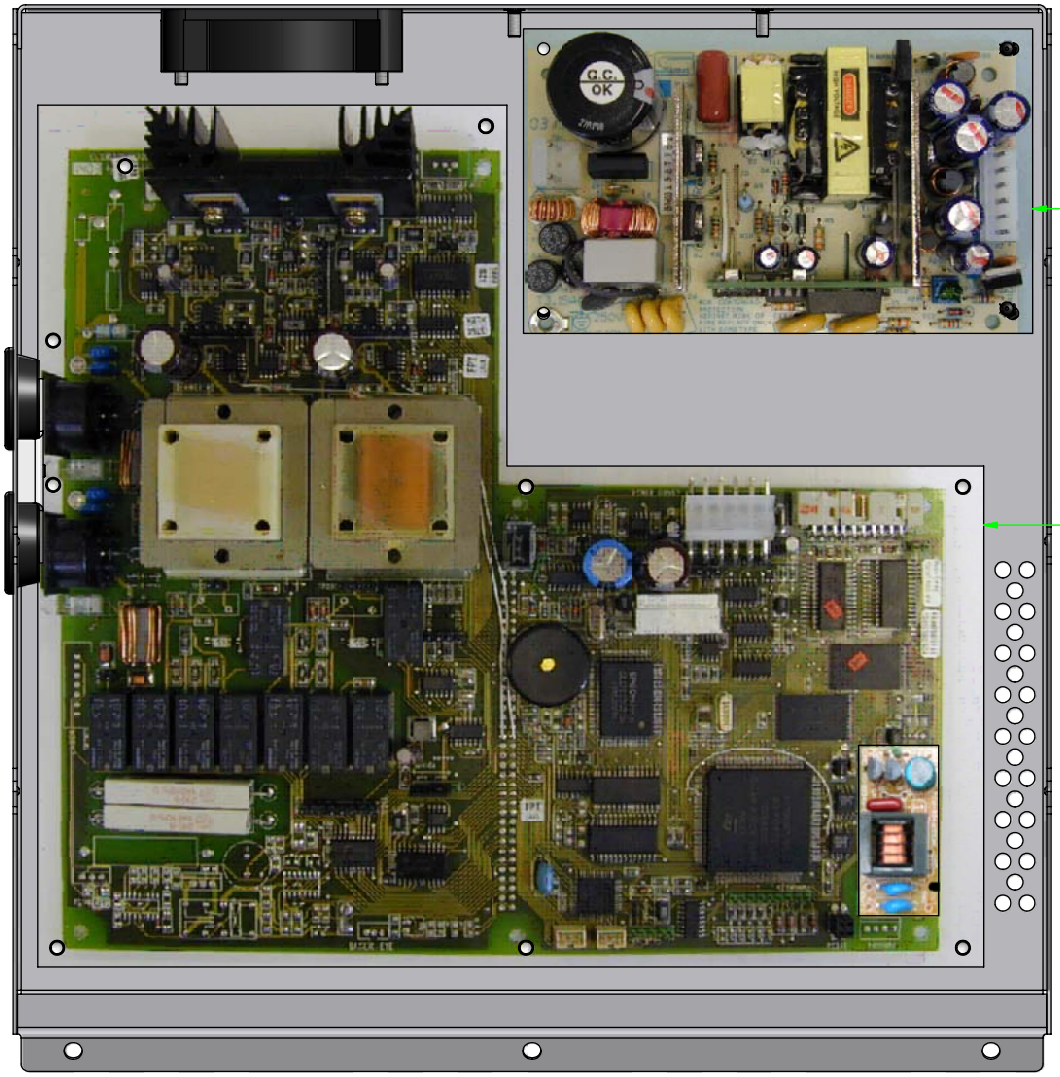
131.559
ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U

Sheet : 3 / 3			**Fiche nr.:**
General tol.:	**Material:**		**Surface treatment:**
GymnaUniphy YOUR PHYSIO COMPANY	EXPLODED VIEW Phyaction C		**Art. nr.:** 323.221
	TITLE:		**Filename:** Phyaction C
A3	**Scale:**	**Designed by:** Steph Collart	**Date:** **06/05/2004**



Pos	Qty	Art. Nr.	TITLE	Detail
19	2	117.146	RUBBER RING, ET OUTPUT, 200-SERIES & PHY. I/E/C	
18	1	117.142	FIXING PLATE ET CONNECTORS, C/D.200 & PHY. I/E/C	
17	1	117.102	FAN, 200-SERIES & PHY. I/E/C/U	
16	1	117.148	CABLE ASSY MAINS INLET, BOX EARTH, 200-SERIES & PHY. I/E/C/U	
15	1	138.404	LCD DISPLAY, QVGA, BLUE, GUID. C/E & PHY. I/E/C/U	
14	4	117.144	FOOT PLUG, 200-SERIES & PHY. I/E/C/U	
13	1	322.649	LOWER METAL HOUSING, PHYACTION I/E	
12	1	322.528	MAIN PCB., PHYACTION E/C	SHEET 2
11	2	117.152	SCREW PLASTIC/MOUNT PCB SUPPORT, 200-SERIES & PHY. I/E/C/U	
10	1	116.954	POWER SUPPLY 200-SERIES & PHY. I/E/C/U	SHEET 2
9	1	130.015	AC INLET GYMNA, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
8	2	131.559	ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
7	1	322.715	ENCODER SUPPORT+LED, PHYACTION I/E/C/U	
6	1	117.143	ENCODER SUPPORT, 200-SERIES & PHY. I/E/C	
5	1	322.660	UPPER HOUSING PLATE (Metal), PHY. I/E/C/U	
4	1	322.616	UPPERHOUSING (No keyboard), PHY. I/E/C/U	
3	1	322.693	KEYBOARD, PHYACTION E	
2	2	117.145	RUBBER RING, ENCODER, 200-SERIES & PHY. I/E/C/U	
1	2	322.726	KNOB/ ENCODER, PHYACTION I/E/C/U	

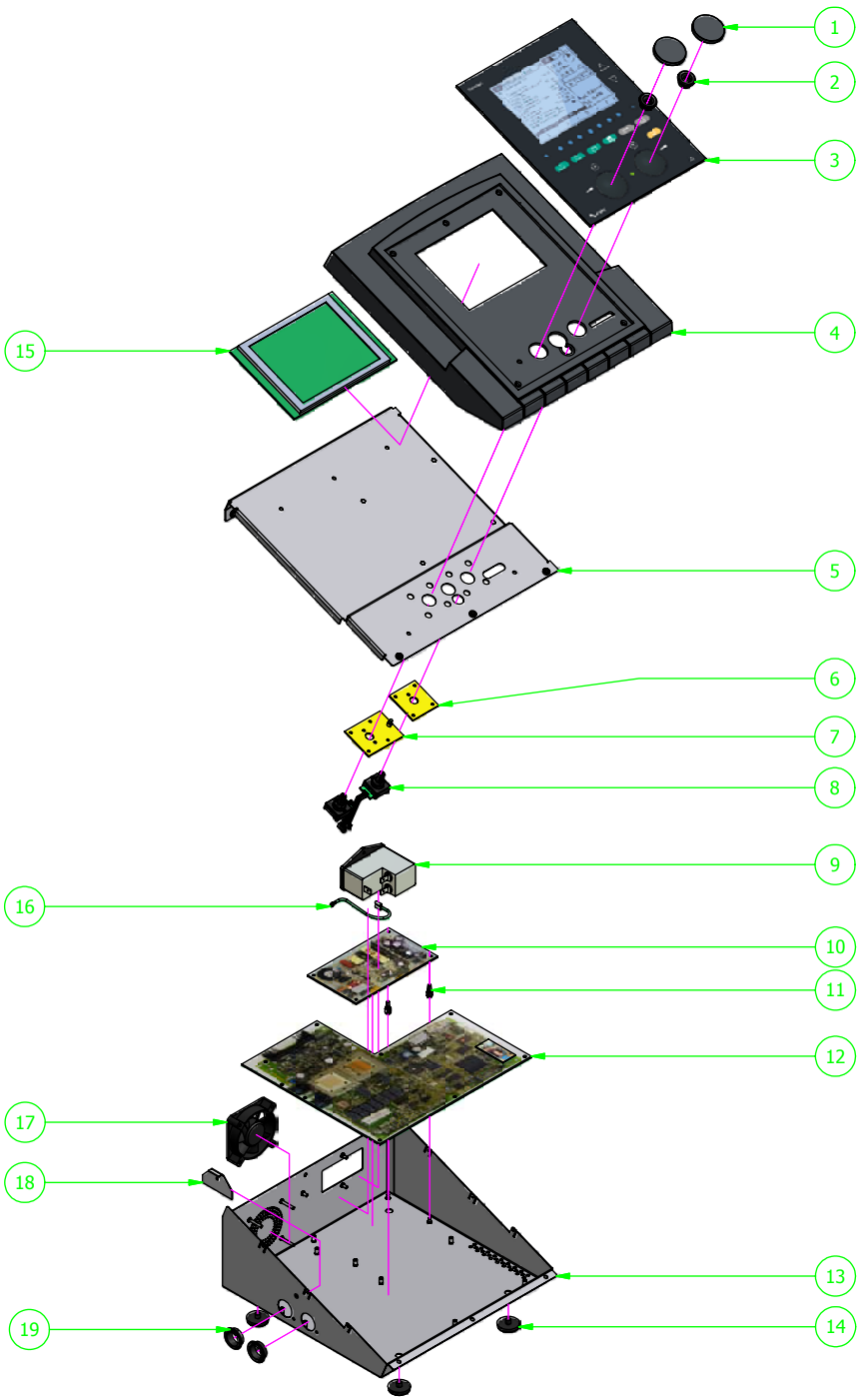
Sheet : 1 / 2			**Fiche nr.:**
General tol.:	**Material:**		**Surface treatment:**
GymnaUniphy YOUR PHYSIO COMPANY	**TITLE:** EXPLODED VIEW Phyaction E		**Art. nr.:** 323.199
			Filename: Phyaction E
A3	**Scale:**	**Designed by:** Steph Collart	**Date:** **06/05/2004**



116.954
POWER SUPPLY 200-SERIES & PHY. I/E/C/U

322.528
MAIN PCB., PHYACTION E/C

Sheet : 2 / 2		**Fiche nr.:**
General tol.:	**Material:**	**Surface treatment:**
GymnaUniphy	EXPLODED VIEW Phyaction E	**Art. nr.:** 323.199
	TITLE:	**Filename:** Phyaction E
A3	**Scale:** **Designed by:** Steph Collart	**Date:** **06/05/2004**



Pos	Qty	Art. Nr.	TITLE	Detail
19	2	117.146	RUBBER RING, ET OUTPUT, 200-SERIES & PHY. I/E/C	
18	1	117.142	FIXING PLATE ET CONNECTORS, C/D.200 & PHY. I/E/C	
17	1	117.102	FAN, 200-SERIES & PHY. I/E/C/U	
16	1	117.148	CABLE ASSY MAINS INLET, BOX EARTH, 200-SERIES & PHY. I/E/C/U	
15	1	138.404	LCD DISPLAY, QVGA, BLUE, GUID. C/E & PHY. I/E/C/U	
14	4	117.144	FOOT PLUG, 200-SERIES & PHY. I/E/C/U	
13	1	322.649	LOWER METAL HOUSING, PHYACTION I/E	
12	1	324.914	MAIN PCB. PHYACTION I	SHEET 2
11	2	117.152	SCREW PLASTIC/MOUNT PCB SUPPORT, 200-SERIES & PHY. I/E/C/U	
10	1	116.954	POWER SUPPLY 200-SERIES & PHY. I/E/C/U	SHEET 2
9	1	130.015	AC INLET GYMNA, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
8	2	131.559	ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
7	1	322.715	ENCODER SUPPORT+LED, PHYACTION I/E/C/U	
6	1	117.143	ENCODER SUPPORT, 200-SERIES & PHY. I/E/C	
5	1	322.660	UPPER HOUSING PLATE (Metal), PHY. I/E/C/U	
4	1	322.616	UPPERHOUSING (No keyboard), PHY. I/E/C/U	
3	1	322.704	KEYBOARD, PHYACTION I	
2	2	117.145	RUBBER RING, ENCODER, 200-SERIES & PHY. I/E/C/U	
1	2	322.726	KNOB/ ENCODER, PHYACTION I/E/C/U	

Sheet : 1 / 2 | **Fiche nr.:**

General tol.: | **Material:** | **Surface treatment:**

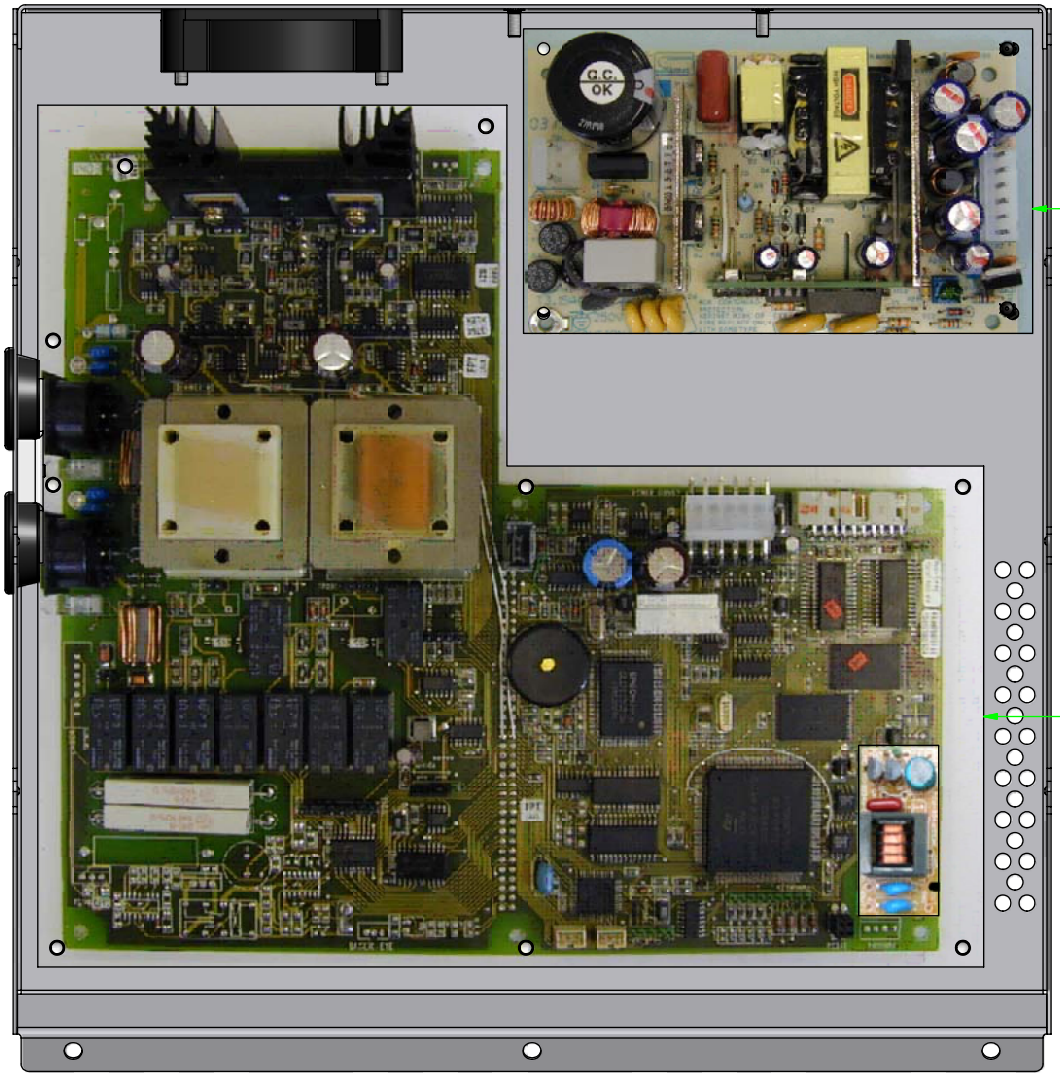
GymnaUniphy — YOUR PHYSIO COMPANY

TITLE: EXPLODED VIEW Phyaction I

Art. nr.: 323.210

Filename: Phyaction I

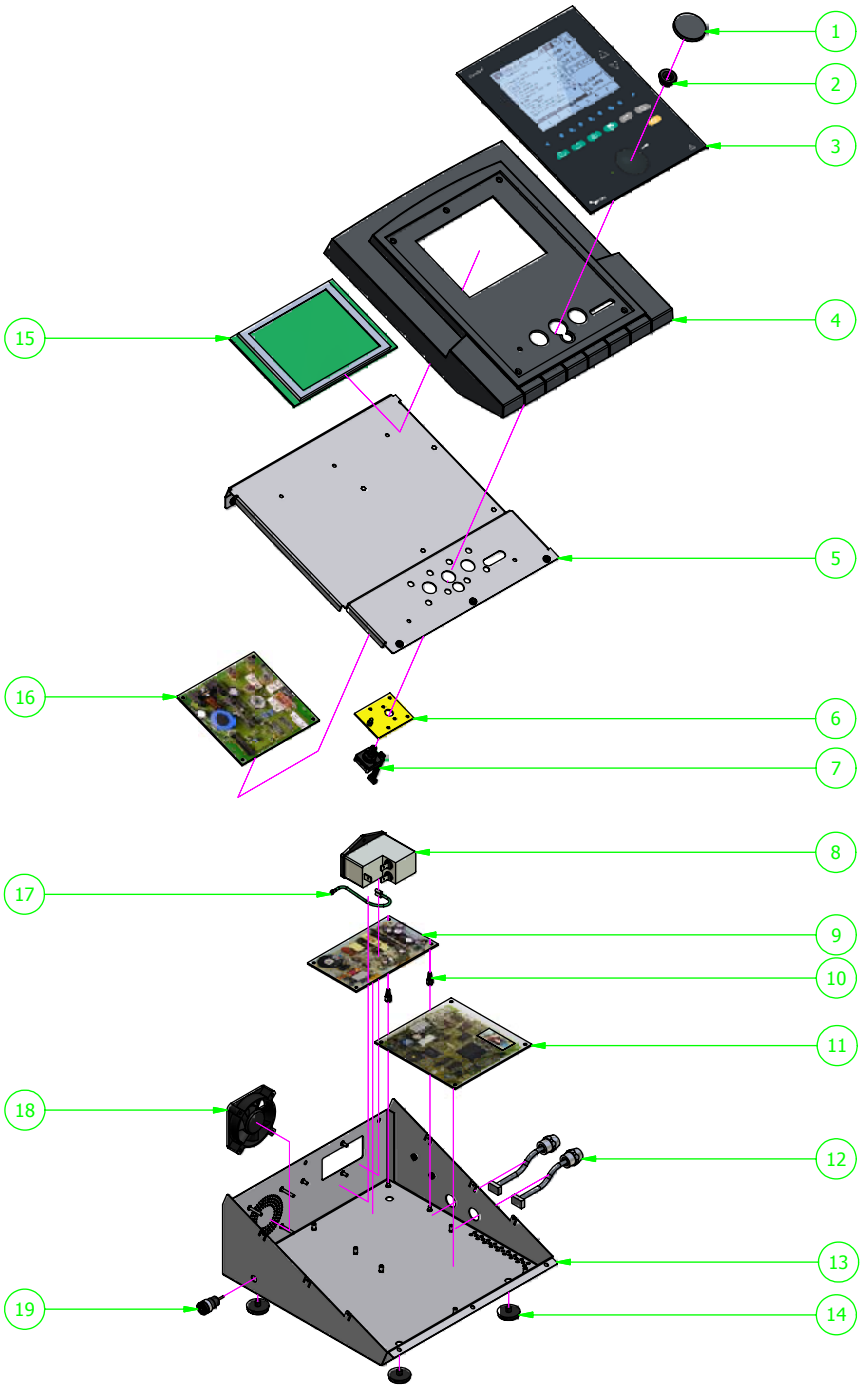
A3 | **Scale:** | **Designed by:** Steph Collart | **Date:** 06/05/2004



116.954
POWER SUPPLY 200-SERIES & PHY. I/E/C/U

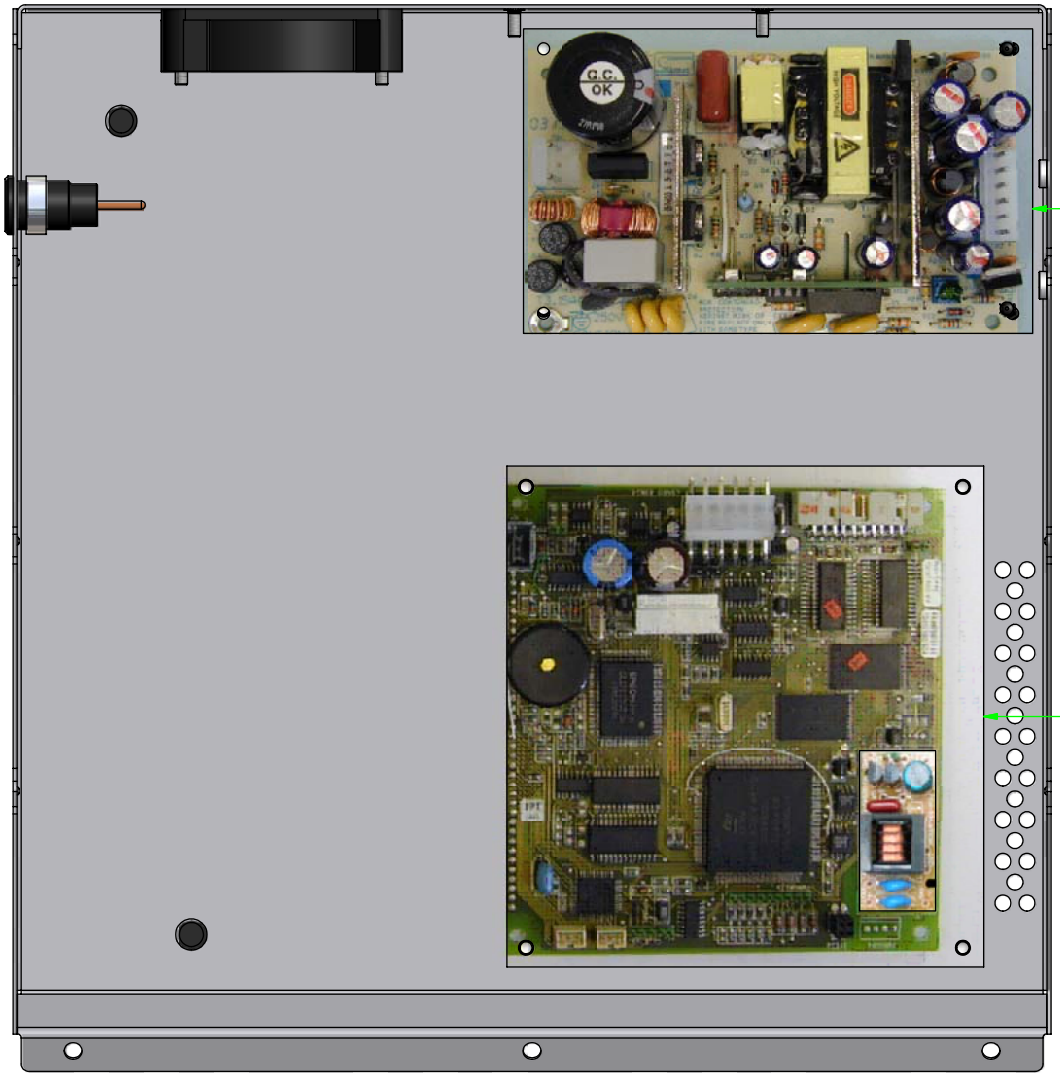
324.914
MAIN PCB. PHYACTION I

Sheet : 2 / 2		**Fiche nr.:**
General tol.:	**Material:**	**Surface treatment:**
GymnaUniphy	EXPLODED VIEW Phyaction I	**Art. nr.:** 323.210
	TITLE:	**Filename:** Phyaction I
A3	**Scale:** **Designed by:** Steph Collart	**Date:** **06/05/2004**



Pos	Qty	Art. Nr.	TITLE	Detail
19	1	137.205	OUTLET CONN., 4mm, EL.THERAPY, PHY.7XX & U	
18	1	117.102	FAN, 200-SERIES & PHY. I/E/C/U	
17	1	117.148	CABLE ASSY MAINS INLET, BOX EARTH, 200-SERIES & PHY. I/E/C/U	
16	1	117.162	ULTRASOUND PCB., C/P.200 & PHY. C/U	
15	1	138.404	LCD DISPLAY, QVGA, BLUE, GUID. C/E & PHY. I/E/C/U	
14	4	117.144	FOOT PLUG, 200-SERIES & PHY. I/E/C/U	
13	1	332.638	LOWER METAL HOUSING, PHYACTION U	
12	2	322.737	CUS. OUTPUT CABLE ASSY, PHY. C/U	
11	1	322.517	MAIN PCB., PHYACTION U	
10	2	117.152	SCREW PLASTIC/MOUNT PCB SUPPORT, 200-SERIES & PHY. I/E/C/U	SHEET 3
9	1	116.954	POWER SUPPLY 200-SERIES & PHY. I/E/C/U	SHEET 3
8	1	130.015	AC INLET GYMNA, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	
7	1	131.559	ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U	SHEET 2
6	1	322.715	ENCODER SUPPORT+LED, PHYACTION I/E/C/U	SHEET 2
5	1	322.660	UPPER HOUSING PLATE (Metal), PHY. I/E/C/U	
4	1	322.616	UPPERHOUSING (No keyboard), PHY. I/E/C/U	
3	1	322.682	KAYBOARD, PHYACTION U	
2	1	117.145	RUBBER RING, ENCODER, 200-SERIES & PHY. I/E/C/U	
1	1	322.726	KNOB/ ENCODER, PHYACTION I/E/C/U	

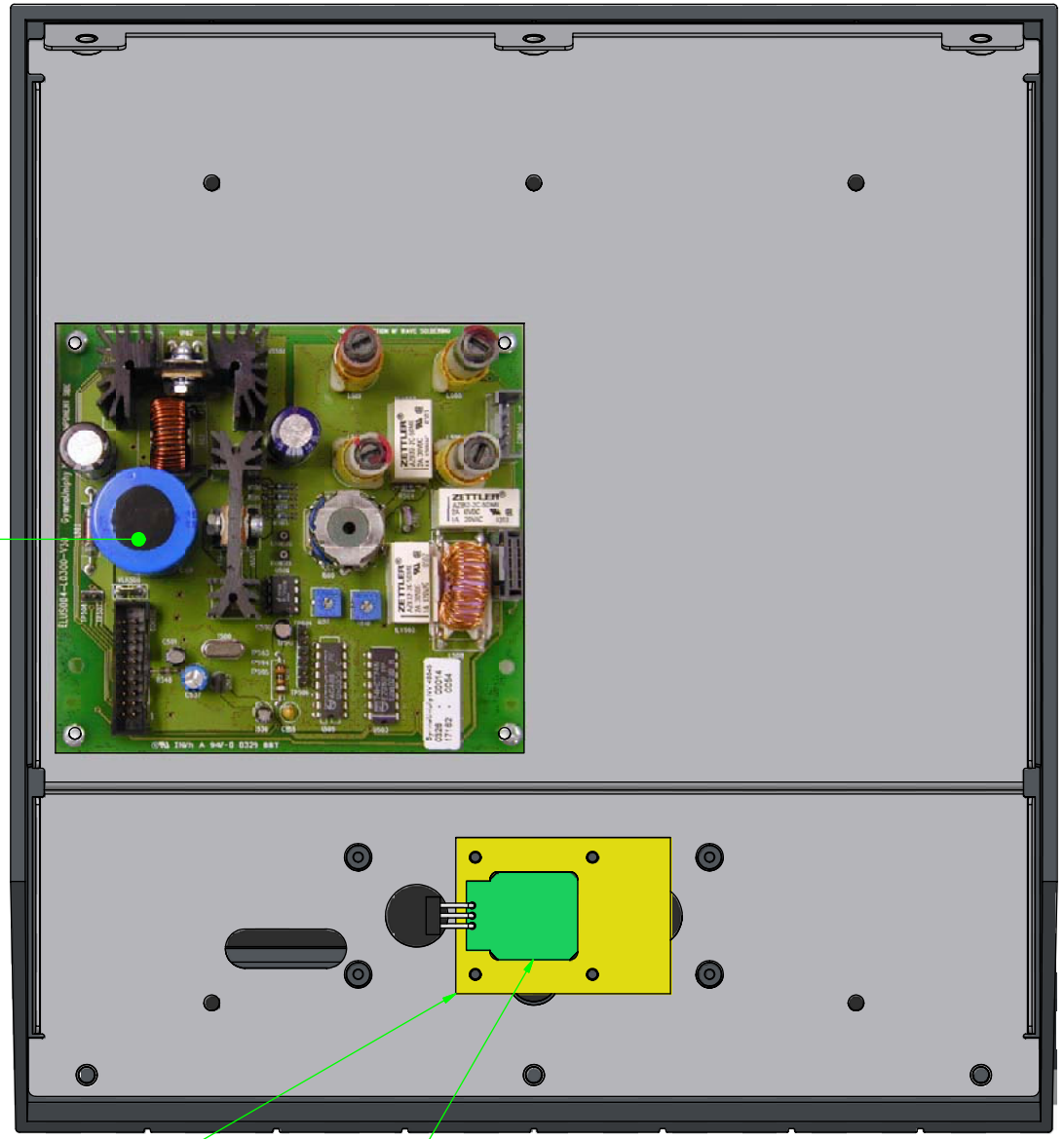
Sheet : 1 / 3			**Fiche nr.:**
General tol.:	**Material:**		**Surface treatment:**
GymnaUniphy YOUR PHYSIO COMPANY	**TITLE:** EXPLODED VIEW Phyaction U		**Art. nr.:** 323.232
			Filename: Phyaction U
A3	**Scale:**	**Designed by:** Steph Collart	**Date:** 06/05/2004



116.954
POWER SUPPLY 200-SERIES & PHY. I/E/C/U

322.517
MAIN PCB., PHYACTION U

Sheet : 2 / 3		**Fiche nr.:**
General tol.:	**Material:**	**Surface treatment:**
GymnaUniphy	EXPLODED VIEW Phyaction U	**Art. nr.:** 323.232
	TITLE:	**Filename:** Phyaction U
A3	**Scale:** **Designed by:** Steph Collart	**Date:** **06/05/2004**



117.162
ULTRASOUND PCB., C/P.200 & PHY. C/U

322.715
ENCODER SUPPORT+LED, PHYACTION I/E/C/U

131.559
ENCODER ASSY, C/D.500 & G.C/E & 200-SERIES & PHY. I/E/C/U

Sheet : 3 / 3		**Fiche nr.:**
General tol.:	**Material:**	**Surface treatment:**
GymnaUniphy	EXPLODED VIEW Phyaction U	**Art. nr.:** 323.232
	TITLE:	**Filename:** Phyaction U
A3	**Scale:** **Designed by:** Steph Collart	**Date:** **06/05/2004**